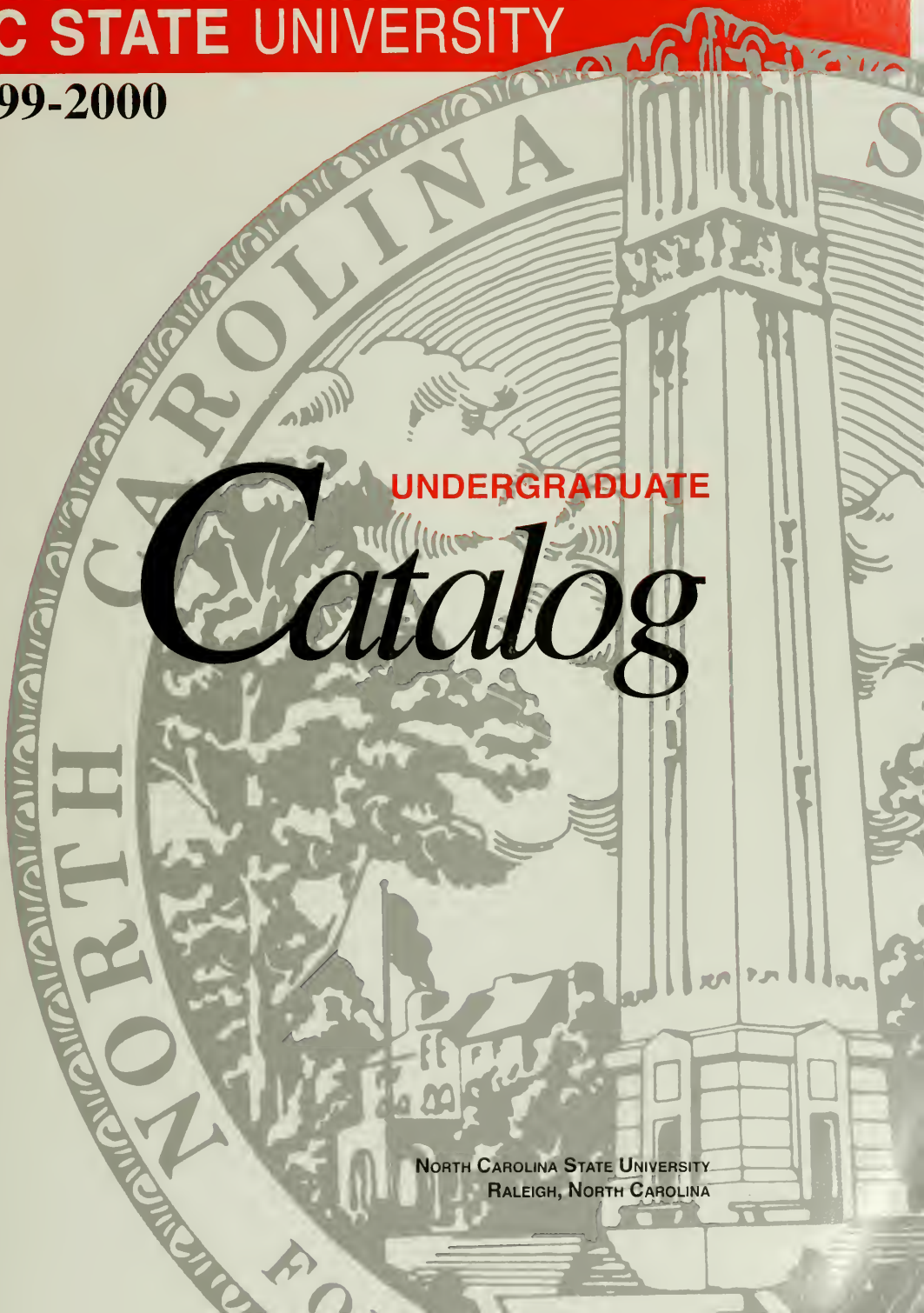
NC STATE UNIVERSITY

1999-2000



UNDERGRADUATE

Catalog

North Carolina State University
Raleigh, North Carolina

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NC STATE UNIVERSITY

North Carolina State University is a national center for research, teaching, and extension in the sciences and technologies, in the humanities and social sciences, and in a wide range of professional programs.

Founded March 7, 1887, by the North Carolina General Assembly under the provisions of the national Land Grant Act, the University has marked more than a century of service to the state and the nation. Sharing the distinctive character of LandGrant universities nationwide, NC State has broad academic offerings, national and international linkages, and large-scale outreach, extension, and research activities.

NORTH CAROLINA STATE UNIVERSITY HISTORICAL SKETCH

On March 7,1887, the North Carolina General Assembly passed the act which authorized the establishment of the North Carolina College of Agriculture and Mechanic Arts. The Watauga Club of Raleigh and the statewide farmers' movement had convinced the legislature of the need to transfer the funds received by the state under the provisions of the Morrill Land Grant Act of 1862 from the University of North Carolina in Chapel Hill to a new landgrant college in Raleigh. The cornerstone of A. and M. College was laid in August, 1888, and its doors were officially opened on October 3, 1889.

Alexander Q. Holladay, the college's first president (1889-1899), and a faculty of five offered courses in agriculture, horticulture, pure and agricultural chemistry, English, bookkeeping, history, mathematics, physics, practical mechanics, and military science. The first freshman class numbered about fifty students. By the end of the institution's first decade the resident enrollment had reached 300.

During the administration of **George T. Winston** (1899-1908) a new curriculum in textiles was developed and normal courses were offered in the summer for public school teachers, both men and women. The Agricultural Extension Service was established during the administration of Daniel H. Hill (1908-1916) and enrollment grew to more than 700. In 1917, during the administration of **Wallace C. Riddick** (1916-1923), the institution's name was changed to North Carolina State College of Agriculture and Engineering. The introduction of the word engineering was intended to reflect the increasing emphasis on the professional and theoretical as well as the practical aspects of technical education.

In 1923, a major reorganization of the administration of the college was begun, and President Riddick resigned to become the first dean of the new School of Engineering. **Eugene Clyde Brooks** (1923-1934), the fifth president of State College, continued the reorganization with the creation of the School of Agriculture (later renamed the School of Agriculture and Forestry), the School of Science and Business, the School of Education, the School of Textiles, and the Graduate School. Resident enrollment rose to nearly 2,000 in 1929 before the Depression caused a drop to approximately 1,500 in 1933. The first women graduates of State College received their degrees in 1927.

In the midst of the Depression the General Assembly of 1931 attempted to promote economy and to prevent unnecessary duplication among the three leading state institutions of higher education by establishing a single consolidated administration for the University of North Carolina in Chapel Hill, North Carolina State

College of Agriculture and Engineering, and North Carolina College for Women in Greensboro. Dr. Frank Porter Graham, president of the University of North Carolina, was elected president of the consolidated university, and Dr. Brooks, with the title of vice president, continued as chief administrative officer at State College. Among the consequences of consolidation were the phasing out of the School of Engineering at Chapel Hill and the School of Science and Business at Raleigh. A general college, later called the Basic Division, was established to provide two years of basic courses in humanities, social sciences, and natural sciences as a foundation for students in the various degree-granting technical and professional schools.

Colonel **John W. Harrelson** (1934-1953), Class of 1909, was the first alumnus to become administrative head of State College. Under the consolidated organization his title was Dean of Administration; later it was changed to Chancellor. During Harrelson's administration, the institution experienced the beginning of extraordinary growth in the aftermath of World War II. Two new schools were established: the School of Design and the School of Forestry. A multimillion dollar expansion program was completed during the administration of **Carey H. Bostian** (1953-1959), and the program of student activities was greatly enlarged, as the enrollment passed 5,000.

The faculty and student population more than doubled during the administration of **John T. Caldwell** (1959-1975) and another new school was organized: the School of Physical Sciences and Applied Mathematics (now Physical and Mathematical Sciences). The School of General Studies, the successor to the Basic Division, was renamed the School of Liberal Arts and was authorized to offer a full range of bachelor's and master's degree programs in the humanities and social sciences. The name of the institution itself was changed in 1965 to North Carolina State University, signifying its new role as a comprehensive university.

NC State's enrollment passed 20,000 during the administration of Chancellor **Joab L. Thomas** (1976-1981). The School of Veterinary Medicine was established, the name of the School of Liberal Arts was changed to School of Humanities and Social Sciences, and North Carolina State University was recognized as one of two major research universities within the statewide University of North Carolina.

Bruce R. Poulton (1982-1990) became chancellor in the fall of 1982. A major expansion of the University's research budget, the establishment of a substantial endowment to provide enlarged resources for research equipment and endowed professorships, and the addition of the 1,000-acre Centennial Campus occurred during this administration. All of the schools were renamed colleges except for the School of Design and The Graduate School. In addition, the School of Education became the College of Education and Psychology.

In 1990, **Larry K. Monteith**, an alumnus and former Dean of the College of Engineering, became chancellor and NC State's eleventh chief administrative officer. Among his early initiatives were the creation of the Division of Undergraduate Studies and the First Year Experience Program. In 1992, the College of Management was established, and plans for a freshman college have recently been formalized. An Institutional Advancement Division, now known as University Advancement, was organized to include alumni relations, university relations, development, and advancement services. A Board of Visitors was created, comprised of nationally prominent scholars and business leaders, to advise the chancellor and Board of Trustees.

The College of Textiles and ABB (Asea Brown Boveri), NC State's first corporate partner, moved to Centennial Campus in 1991. Since then, the Centennial Campus celebrated its 10th anniversary and surpassed the $100 million mark in construction. The Engineering Graduate Research Center was the newest building on that campus at that time.

In 1994, NC State was authorized to establish the Zeta Chapter of the Phi Beta Kappa Society.

On August 1, 1998, **Dr. Marye Anne Fox**, a chemist and member of the National Academy of Sciences, became NC State University's 12th chancellor to assume the duties of the top post at the state's leading science, engineering and technology university. Chancellor Fox is focused on building the campus community, promoting partnerships, and adopting a business model that works. She has co-chaired the first National Academy of Sciences symposium ever held at NC State and encourages further growth on the university's Centennial Campus. Since her arrival, Chancellor Fox has traveled more than 3,000 miles within the state to visit the hometowns of NC State students. She engaged business and community leaders and NC State alumni to learn more about the citizens' needs and the vital role of NC State in North Carolina's economic growth and success.

MISSION OF NORTH CAROLINA STATE UNIVERSITY*

The mission of North Carolina State University is to serve its students and the people of North Carolina as a Research I, land-grant university. Through the active integration of teaching, research, and extension, North Carolina State University creates an innovative learning environment that stresses mastery of fundamentals, intellectual discipline, creativity, problem solving, and responsibility. Enhancing its historic strengths in agriculture, science, and engineering with a commitment to excellence in a comprehensive range of academic disciplines, North Carolina State University provides leadership for intellectual, cultural, social, economic and technological development within the state, the nation and the world.

*Approved by the North Carolina State University Board of Trustees on April 19, 1996.

CAMPUS

The central campus of the University, located west of the downtown area of Raleigh, consists of 179 major buildings on 623 acres. Adjacent to the central campus are the new 1,000acre Centennial Campus and the College of Veterinary Medicine campus. Nearby are research farms; biology and ecology sites; genetics, horticulture, and floriculture nurseries; forests; and CarterFinley Stadium that together extend over 2,700 acres. Elsewhere across the state are research farms and a research forest of 82,000 acres.

RESEARCH TRIANGLE

NC State is one of the three Research Triangle universities along with Duke University in Durham and the University of North Carolina at Chapel Hill. Within the 30 mile triangle formed by the three universities is the 6,800 acre Research Triangle Park, location of many public research agencies and private research centers of national and international corporations.

FACULTY

The University has approximately 6,200 employees, of which approximately 1,570 are instructional faculty. Among the many honors and recognition received by members of the faculty are nine memberships in the National Academy of Science

and nine in the National Academy of Engineering, 60 named professorships, 21 University Distinguished Professorships, 108 Alumni Distinguished Undergraduate Professors, and currently over 355 members of the Academy of Outstanding Teachers.

TEACHING AND RESEARCH

The University is organized into nine colleges, the School of Design, the Graduate School, and the Division of Undergraduate Studies. The colleges are Agriculture and Life Sciences, Education and Psychology, Engineering, Forest Resources, Humanities and Social Sciences, Management, Physical and Mathematical Sciences, Textiles, and Veterinary Medicine. These colleges and schools offer baccalaureate degrees in 89 fields, master's degrees in 80 fields, and doctoral degrees in 51 fields. Together with more than 30 research centers and institutes, these colleges and schools also support a broad spectrum of more than 1,200 scientific, technological, and scholarly research endeavors.

OUTREACH AND EXTENSION PROGRAMS

As the state's only research university in the land-grant tradition, North Carolina State has the unique mission to serve the citizens of North Carolina through technical assistance, professional development, lifelong education, and technology transfer programs. The primary channel for fulfilling this mission is through the University's outreach and extension programs, centers and institutes that make a positive contribution to the quality of life for over a million of the state's residents on an annual basis. Expertise from the various schools and colleges provides opportunities for improvements in the areas of economics and business, education and training, natural resources and environmental quality, the humanities, and food and fiber production.

The **Division of Continuing Studies** is an integral component of the outreach effort, offering access to the knowledge and resources of the University. Annually, over 8,000 lifelong learners register in credit courses, both on and off campus, including those delivered via videocassette, cable and satellite throughout the region, the state, the nation and the world. In addition, Summer Sessions which is administered through the Division has an enrollment of almost 14,000 students. Participation in non-credit, continuing education offerings, a majority of which are implemented in the McKimmon Center, totals over 120,000 annually.

STUDENTS

In the 1998 fall semester, the university's regular term head count enrollment totaled 27,960. Included in this number were 18,933 students in undergraduate degree programs, 5,101 in graduate degree programs, 301 First Professional and 3,164 Lifelong Education students. The combined undergraduate and graduate enrollments by college were: Agriculture and Life Sciences - 4,267; Design – 715; Education and Psychology -1,694; Engineering - 6,561; Forest Resources -1,070; Humanities and Social Sciences - 3,060; Management - 2,660; Physical and Mathematical Sciences - 1,292; Textiles - 991;Veterinary Medicine - 411, and First Year College - 1,670. The student population included 2,719 African American students; 1,935 other minority students, and 11,640 female students. Students at the university come from all 50 states, three United States territories, and 87 foreign countries. The international enrollment is a distinctive feature of the institution as 1,147 international students give the campus a cosmopolitan atmosphere.

ASSOCIATIONS

The University is a member of the National Association of State Universities and Land Grant Colleges, the American Council on Education, the American Council of Learned Societies, the Association of Governing Boards of Universities and Colleges, the Oak Ridge Associated Universities, the North Carolina Association of Colleges and Universities, and the Cooperating Raleigh Colleges.

ACCREDITATION

North Carolina State University is accredited by the Commission on Colleges of the Southern Association of Colleges and Schools (1866 Southern Lane, Decatur, Georgia 30033-4097: Telephone number (404) 679-4501 to award the doctoral, master's, baccalaureate, and associate's degrees.

In addition, many of the University's professional programs and departments are accredited by national professional associations, including:

Accreditation Board of Engineering and Technology	1992
Accreditation Board of Engineering and Technology (Environmental Engineering)	1994
Accreditation Board of Engineering and Technology (Industrial Engineering)	1995
American Animal Hospital Association	1995
American Association for Accreditation of Laboratory Animal Care	1997
American Chemical Society	1994
American Psychological Association	1995
American Veterinary Medical Association	1998
Council for Accreditation of Counseling and Related Educational Programs	1994
Computing Sciences Accreditation Board	1992
Council on Social Work Education	1995
Landscape Architectural Accreditation Board	1993
National Architectural Board	1995
National Association of Schools of Public Affairs and Administration	1993
National Council for Accreditation of Teacher Education	1996
National Recreation and Park Association	1997
Society of American Foresters	1994
Society of Wood Science and Technology	1994

NONDISCRIMINATION POLICY

NC State is committed to equality of educational opportunity and does not discriminate against applicants, students, or employees based on race, color, national origin, religion, sex, age, or disability. Moreover, NC State University is open to people of all races and actively seeks to promote racial integration by recruiting and enrolling a larger number of black students.

NC State University is dedicated to equality of opportunity within its community. Accordingly, NC State University does not practice or condone discrimination, in any form, against students, employees, or applicants on the grounds of race, color, national origin, religion, sex, age, or disability.

NC State University commits itself to positive action to secure equal opportunity regardless of those characteristics.

NC State University supports the protections available to members of its community under all applicable Federal laws, including Titles VI and VII of the Civil Rights Act of 1964, Title IX of the Education Amendments of 1972, the Equal Pay and Age Discrimination in Employment Acts, Sections 503 and 504 of the Rehabilitation Act of 1973, the Vietnam Veteran's Readjustment Assistance Act of 1974, Executive Order 11246, as amended, and the Americans with Disabilities Act of 1990.

For information concerning the nondiscrimination policy, contact:

Joanne Woodard
Assistant Provost for Equal Opportunity
304 Holladay Hall, Box 7930
NC State University
Raleigh, North Carolina 27695-7530

Phone: (919) 515-4559 or 515-3148
TTY: (919) 515-9617
e-mail: Joanne_Woodard@ncsu.edu

Further information concerning the following topics, contact the offices listed below:

Undergraduate Admissions
112 Peele Hall
Box 7103
NC State University
Raleigh, NC 27695-7103
Phone: (919) 515-2434
E-mail: Undergrad_Admissions@ncsu.edu

Academic Programs, Office of the Provost
206 Holladay Hall
Box 7526
NC State University
Raleigh, NC 27695
Phone: (919) 515-2194
E-mail: academic@ncsu.edu

NC STATE UNIVERSITY
ADMINISTRATION AND OFFICES

OFFICE OF THE CHANCELLOR
Marye Anne Fox, *Chancellor*
Clare M. Kristofco, *Senior Assistant to the Chancellor*
Hank Fiumara, *Director, University Improvement Programs*

OFFICE OF THE PROVOST AND VICE CHANCELLOR
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C. Frank Abrams Jr., *Senior Associate Provost for Academic Affairs*
William C. Grant, *Associate Provost and Facilitator of African-American Affairs*
Rebecca Leonard, *Assistant Provost and Facilitator of Gender Equity*
Bruce I. Mallette, *Assistant Provost for Administration*
Joanne G. Woodard, *Assistant Provost for Equal Opportunity*
George R. Dixon, *Vice Provost for Enrollment Management and Services and Director of Admissions*
Sondra L. Kirsch, *Vice Provost, Continuing Studies*
Sam Averitt, *Interim Vice Provost, Information Technology*
Carl Malstrom, *Assistant Vice Provost for Information Technology*
Susan K. Nutter, *Vice Provost and Director, NCSU Libraries*
Karin L. Wolfe, *Director of Office of Academic Personnel Services*

COMPUTING CENTER
Sam Averitt, *Director of Computing Services*

ENROLLMENT MANAGEMENT AND SERVICES
George R.Dixon, *Vice Provost for Enrollment Management and Services and Director of Admissions*
Financial Aid
Julia R. Mallette, *Director*
Registration and Records
Martha M. Welch, *Registrar*
Undergraduate Admissions
George R. Dixon, *Vice Provost for Enrollment Management and Services and Director of Admissions*

NCSU LIBRARIES
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UNIVERSITY PLANNING AND ANALYSIS
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LEGAL AFFAIRS
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Thomas E. H. Conway, *Associate Dean*
Jo Allen, *Assistant Dean*
Academic Support Program for Student Athletes
Philip Moses, *Director*
Co-operative Education
Arnold Bell, *Director*
First Year College
Thomas Conway, *Director*
Barbara A. Soloman, *Associate Director for Advising*
Janice E. Odom, *Associate Director for Partnerships and Programming*
New Student Orientation Program
Roger A.E. Callanan, *Director*
Transition Program
Ron L. Mimms, *Director*

Undergraduate Studies Tutorial Center
Ann F. Mann, *Director*

THE GRADUATE SCHOOL
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Robert S. Sowell, *Associate Dean*
Margaret F. King, *Associate Dean*

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Lisa P. Zapata, *Assistant to the Vice Chancellor*
Gerald G. Hawkins, *Director, Caldwell-Fellows Program*
Center for Student Leadership, Ethics and Public Service
Janey Musgrave, Director
Center Stage/Arts Outreach
Sharon H. Moore, Director
Counseling Center
M. Lee Salter, *Director*
Crafts Center
James V. Pressley, *Director*
Dance Program
Robin Harris Taylor, *Director*
Disability Services for Students
Patricia Smith, *Coordinator*
Educational Talent Search
Marsha Boyd Pharr, *Director*
Gallery of Art and Design
Charlotte V. Brown, *Director*
Greek Life
Melinda B. Sopher, *Director*
Merit Awards and Special Scholarships
Patricia J. Lee, *Director*
Music Department
Robert B. Petters, *Director*
Physical Education Department
Judy C. Peele, *Head*
ROTC Units
Air Force: Robert Ostrander, *Commander*
Army: David Cannon, *Commander*
Navy & Marine Corps: Nicholas Taylor, *Officer in Charge*
Student Conduct, Office of
Paul Cousins, Director
Student Activities Office
Deborah C. Luckadoo, *Director*
Frances Graham, *Coordinator, Women's Center*
Student Development
Robert Bryan, *Director*
Lathan Turner, *Coordinator, African-American Student* Affairs
Fran Russ, *Coordinator, Student Media Advising*
Student Health Service
Jerry Barker, *Director*
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Study Abroad
Ingrid Schmidt, *Director*

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University Dining
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Tim Luckadoo, *Associate to the Vice Chancellor for University Housing & Greek Life*
University Scholars Program
N. Alexander Miller, *Director*
University Student Centers
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Upward Bound
Marcia Boyd Pharr, *Director*
Upward Bound Praise
Willie Edmonds, *Interim Director*

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Kathryn S. Hart, *Treasurer*
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David Williamson, *Director*
Bookstores
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Budget Office
Marion Neal, *Director*
Central Stores
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Foundations Accounting and Investments
Putney Jones, *Director*
Insurance and Risk Management
Anne Hitchcock, *Director*
Network and Client Services
Gwen Hazelhurst, *Director*
Physical Plant
James R. Vespi, *Director*
Public Safety
Ralph L. Harper, *Director*
Purchasing
Robert Wood, *Director*

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Student Accounts
Craig Moore, *Director*
Telecommunications
Jennifer Van Horn, *Director*
Transportation
Cathy Reeve, *Director*
University Accounting Office
Paula Tate, *Controller*
University Architect
Edwin F. Harris
University Graphics
Catherine Armitage, *Director*
University Payroll Office
Brian Simet, *Director*

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W. Mark Crowell, *Associate Vice Chancellor, Technology Transfer and Industry Research*
Russ Lea, *Assistant Vice Chancellor, Research*
John J. O'Neil, *Assistant Vice Chancellor, Research Development*

UNIVERSITY ADVANCEMENT
Jeff McNeill, *Vice Chancellor*
Advancement Services
Paul Eberle, *Associate Vice Chancellor*
Alumni Relations
Jim Bass, *Associate Vice Chancellor*

ATHLETICS
Les Robinson, *Director*

FACULTY SENATE
Frederick Corbin, *Chair*

HONORS COUNCIL
John N. Wall, *Director*

COLLEGE OF AGRICULTURE AND LIFE SCIENCES
James L. Oblinger, *Dean and Executive Director for Agricultural Programs*
George T. Barthalmus, *Associate Dean and Director for Academic Programs*
Jon F. Ort, *Associate Dean, Cooperative Extension Service*
Johnny C. Wynne, *Associate Dean and Director, Agricultural Research Service*
Katie Perry, *Assistant Dean for Administration*
R. Mark Fleming, *Assistant to Dean*
L. George Wilson, *Coordinator of International Programs*
John C. Cornwell, *Assistant Director of Academic Programs, Director of Agricultural Institute*
Barbara M. Kirby, *Assistant Director of Academic Programs*

SCHOOL OF DESIGN
Marvin J. Malecha, *Dean*
John Tector, *Associate Dean, Undergraduate Studies and Academic Affairs*
Martha Scotford, *Associate Dean, Graduate Studies, Research, Outreach and Extension*

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John R. Kolb, *Associate Dean, Academic Affairs*
Edwin R. Gerler, *Associate Dean, Research and External Affairs*
Anona P. Smith, *Assistant Dean, Student Services*

COLLEGE OF ENGINEERING
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Sarah A. Rajala, *Associate Dean, Academic Affairs*
John G. Gilligan, *Associate Dean, Research and Graduate Programs*
Thomas K. Miller, *Associate Dean, Distance Education and Information Technology*
Gordon K. Lee, *Assistant Dean, Research Programs*
Tony L. Mitchell, *Assistant Dean, Engineering Student Services*
Richard L. Porter, *Assistant Dean, Academic Affairs*

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Larry W. Tombaugh, *Dean*
J. Douglas Wellman, *Associate Dean, Academic Affairs*
J. B. Jett, *Associate Dean, Research*

COLLEGE OF HUMANITIES AND SOCIAL SCIENCES
Margaret A. Zahn, *Dean*
M. Mohan Sawhney, *Associate Dean, Academic Affairs*
Mathew T. Zingraff, *Associate Dean, Research*
Gail W. O'Brien, *Associate Dean, Graduate Programs*
Edward T. Funkhouser, *Assistant Dean, Undergraduate Academic Affairs*

COLLEGE OF MANAGEMENT
Jon W. Bartley, *Interim Dean*
Gilroy J. Zuckerman, *Interim Associate Dean, Academic Affairs*

COLLEGE OF PHYSICAL AND MATHEMATICAL SCIENCES
Jerry L. Whitten, *Dean*
Daniel L. Solomon, *Associate Dean, Academic Affairs*
Raymond E. Fornes, *Associate Dean, Research*

COLLEGE OF TEXTILES
Robert A. Barnhardt, *Dean*
Charles D. Livengood, *Associate Dean, Academic Programs; Director, Graduate Programs*
Philip R. Dail, Coordinator, *Undergraduate Advising*
David R. Buchanan, *Associate Dean, Extension and Applied Research*
Perry Grady, *Associate Dean, Special Projects*
Brenda Allen, *Coordinator, Diversity Programs*
C. L. Barton, *Assistant to the Dean, Student Services and Placement*
T. M. Langley, *Student Services Manager*
S. T. Wiener, *Librarian, Burlington Textiles Library*

COLLEGE OF VETERINARY MEDICINE
Oscar J. Fletcher, *Dean*
David G. Bristol, *Associate Dean and Director, Academic Affairs*
Neil Olson, *Associate Dean and Director, Graduate Studies and Research*
David J. DeYoung, *Associate Dean and Director, Veterinary Services*

ACADEMIC CALENDAR

1999 FALL SEMESTER

August	16	Monday	First day of classes
September	6	Monday	Holiday (Labor Day)
October	11-12	Mon.-Tues.	Fall Break
October	13	Wednesday	Classes resume at 8:05 a.m.; 8:35 a.m. Centennial Campus
November	24	Wednesday	Thanksgiving vacation begins at 10:20 p.m.
November	25-26	Thurs.-Fri.	Thanksgiving Holidays
November	29	Monday	Classes resume at 8:05 a.m.; 8:35 a.m. Centennial Campus
December	3	Friday	Last day of classes
December	6-14	Mon.-Tues.	Final examinations
December	15	Wednesday	Fall Graduation Exercise

2000 SPRING SEMESTER

January	10	Monday	First day of classes
January	17	Monday	Holiday (Martin Luther King, Jr. Day)
January	18	Tuesday	No classes
March	10	Friday	Spring vacation begins at 10:20 p.m.
March	13-17	Mon.-Fri.	Spring Break
March	20	Monday	Classes resume at 8:05; 8:35 a.m. Centennial Campus
April	19-20	Wed.-Thurs.	No classes
April	21	Friday	Holiday (Good Friday)
May	5	Friday	Last day of classes
May	8-16	Mon.-Tues.	Final examinations
May	20	Saturday	Spring Commencement

2000 FIRST SUMMER SESSION

May	24	Wednesday	First day of classes
May	25	Thursday	Last day to add a course without permission of instructor
June	27	Tuesday	Last day of classes
June	28	Wednesday	Reading Day
June	29-30	Mon-Tues.	Final examinations

2000 SECOND SUMMER SESSION

July	5	Wednesday	First day of classes
August	8	Tuesday	Last day of classes
August	9	Wednesday	Reading Day
August	10-11	Wed.-Thurs.	Final examinations

2000 FALL SEMESTER

August	21	Monday	First day of classes
September	4	Monday	Holiday (Labor Day)
October	14	Friday	Fall vacation begins at 10:20 p.m.
October	16-17	Mon.-Tues.	Fall vacation
October	18	Wednesday	Classes resume at 8:05 a.m. (8:35 a.m. Centennial Campus)
November	22	Wednesday	Thanksgiving vacation begins at 10:20 p.m.
November	23-24	Thurs.-Fri.	Thanksgiving Holiday
November	27	Monday	Classes resume at 8:05 a.m. (8:35 a.m. Centennial Campus)
December	8	Friday	Last day of classes
December	11-19	Mon.-Tues.	Final Examinations
December	20	Wednesday	Fall Graduation Exercise

Note: This calendar is subject to periodic review and revision. Please consult the University Registrar to determine of changes have been made: (919)515-2576.

ACADEMIC FIELDS OF STUDY AND DEGREES

UNDERGRADUATE DEGREES

College of Agriculture and Life Sciences

agricultural business management; agricultural and environmental technology, agricultural and extension education; agronomy; animal science; applied sociology ; biochemistry; biological engineering; biological sciences; botany; environmental sciences; fisheries and wildlife sciences; food science; horticultural science; microbiology; natural resources; poultry science; zoology.
Pre-professional Programs - pre-dental, pre-medical, pre-optometry and pre-veterinary

School of Design

architecture (fifth year program); environmental design in architecture; art and design; industrial design; graphic design; landscape architecture

College of Education and Psychology

education, general studies; health occupations education; business and marketing education; mathematics education; middle grades education; psychology ; science education; technology education.

College of Engineering

aerospace engineering; biological engineering; chemical engineering; civil engineering; computer engineering; computer science; construction engineering and management; electrical engineering; engineering; environmental engineering; industrial engineering; industrial engineering; furniture manufacturing; materials science and engineering; mechanical engineering; nuclear engineering; textile engineering.

College of Forest Resources

environmental sciences; forest management; natural resources; parks, recreation, and tourism management; pulp and paper science and technology; wood products

College of Humanities and Social Sciences

arts applications; communication; English; English education option; French; French education option; history; multidisciplinary studies; philosophy; political science; religious studies; social studies education options: sociology; Spanish; Spanish education option; social work.

College of Management

accounting; business management; economics

College of Physical and Mathematical Sciences

chemistry; environmental sciences; geology; mathematics; meteorology; natural resources; physics; statistics

College of Textiles

textile chemistry; textile engineering; textile and apparel management; textile technology.

PRE-PROFESSIONAL PROGRAMS

Pre-Law Advising Program. Law schools neither prescribe nor recommend a particular undergraduate curriculum for prospective candidates. A student may prepare for law school by a careful use of electives within any of the baccalaureate curricula offered by the nine undergraduate colleges and schools. The pre-law adviser for the University assists any student with an interest in law with selection of appropriate electives and concentrations. The pre-law adviser also works with the Pre-Law Students' Association (PLSA), which is open to all interested students. The PLSA invites outside speakers to make presentations about law schools and careers in the law. In addition, the group has made at least one visit per year to local law schools where the students can attend classes and visit with directors of admissions. At this time, the Pre-Law Advising

Program is administratively housed within the Division of Undergraduate Studies. For further information, consult Mary A. Tetro in the Pre-Law Advising Office, 57 Tucker Hall, (919) 515-5830.

Pre-Medicine, Pre-Dentistry, and Pre-Optometry Programs. Health professional schools seek bright, broadly educated students from any four-year undergraduate curriculum offered at NC State University. Thus, students should choose a departmental major which suits their interests and talents and which would prepare them for an alternative career should they not be accepted into one of the professional schools.

The program of study should include the minimal English, science and mathematics courses listed under the heading Pre-Medical Sciences . Further, the student should seek:

- courses that develop reading, writing and critical thinking skills,
- opportunities in undergraduate research and
- experience in hospitals, clinics, dental and optometry offices or nursing homes.

The University Preprofessional Health Sciences Review Committee assists students in preparing applications and in providing evaluations to professional schools. For further information, consult Professor John Roberts, committee chairman or the program associate, Nancy Cochran (919) 515-3293. Detailed preprofessional information may be viewed on the World Wide Web at: **http://www2.ncsu.edu/ncsu/cals/pre_proff/booklet/sa2mdos.index.html**

PreVeterinary Program This area of study is a non-degree option offered by the College of Agriculture and Life Sciences, this option is available to students majoring in animal science, poultry science, zoology, or biological sciences as well as in many other science curricula, such as biochemistry or chemistry. If a student is accepted to veterinary medical school before completion of their undergraduate degree, some course credits may be transferable from the veterinary program toward completion of the Bachelor of Science degree. Arrangements for this procedure should be made with the degree granting school or department prior to entering veterinary college. For further information, contact the Academic Programs Office of the College of Agriculture and Life Sciences, (919) 515-2614 or the Admissions Office for Veterinary Students of the College of Veterinary Medicine, (919) 513-6205, for general information concerning admission to the Doctor of Veterinary Medicine programs at NC State.

UNDERGRADUATE MINORS

Some departments at NC State offer undergraduate minors for students wishing a systematic program of study in an area outside their major. All minors require at least 15 credit hours and may be either departmental or interdepartmental. Courses within the minor program may be used to satisfy any of the general requirements, including free electives, of a major curriculum. Minors are completely optional, the only requirement being that a student may not minor in the same discipline as their major. Students pursuing a minor must consult with a minor adviser on a plan of work and *must file a copy of this plan with their major adviser at least one semester before graduation. Satisfactory completion of the minor will be noted on the final transcript following graduation.*

Accounting
Africana Studies
Agricultural Business Management
Agricultural and Environmental Technology
Animal Science
Anthropology
Apparel Technology
Applied Sociology
Arts Studies
Biological Sciences
Botany
Business Management
Chemical Engineering
Chinese Studies
Classical Greek
Classical Studies
Cognitive Science
Computer Programming
Crop Science
Design
Design Studies
Economics
English
Entomology
Environmental Science
Film Studies
Fitness Leadership
Food Science
Forest Management
French
Furniture Manufacturing
Genetics
Geology
German
Graphic Communications
History
Horticultural Science
Industrial Engineering
International Studies
Italian Studies
Japanese
Japan Studies
Journalism
Linguistics
Materials Science and Engineering
Mathematics

Meteorology
Microbiology
Military Studies
Music
Nutrition
Outdoor Leadership
Parks, Recreation, and Tourism Management
Philosophy
Physical Education (Coaching Emphasis)
Physics
Political Science
Poultry Science
Psychology
Pulp and Paper Technology
Religious Studies
Russian Studies
Science, Technology, and Society
Social Work
Sociology
Soil Science
Spanish
Statistics
Technical and Scientific Communication
Technology Education
Textile Chemistry
Textile Technology
Textile and Apparel Management
Theater
Women's Studies
Wood Products
World Literature
Zoology

AGRICULTURAL INSTITUTE

Admission to this two-year program requires the completion of an North Carolina State University Undergraduate Admissions application, a high school diploma or equivalent, and one letter of recommendation from a responsible citizen, not a relative, attesting to the prospective student's integrity and character. The program does not carry college credit. An Associate of Applied Science degree is awarded. Fields of study are:

Agribusiness Management
Agricultural Pest Control
Field Crops Technology
Food Processing, Distribution, and Service
General Agriculture
Livestock Management and Technology (General Livestock, Poultry, and Swine Options)
Ornamentals and Landscape Technology
Turfgrass Management

GRADUATE DEGREES

Consult the *Graduate Catalog* or the Graduate School for information on graduate programs and admissions procedures: Graduate School, 103 Peele Hall, Box 7102, North Carolina State University, Raleigh, NC 27695-7102, (919) 515-2872.

ARTS STUDIES

NC State offers a rich variety of courses in the history, analysis, and production of the arts - dance, film, music, theater, visual arts. Many of these courses are open to students without prerequisite, and are offered by 13 departments in four different colleges of the university.

In addition to these courses, most of which focus on a single art form, the *Division of Multidisciplinary Studies* offers special topics courses (MDS 295, 494, 495) each of which deals with several arts media or with the arts in connection with science and technology; information about these courses, which change each year, is available from the Office of Multidisciplinary Studies.

For students who want to concentrate in Arts Studies, a major in Arts Applications is available. It is administered by the Division of Multidisciplinary Studies in the College of Humanities and Social Sciences. In addition, there are minors in Arts Studies, Music, Theatre, Design and Film Studies.

Opportunities for students to participate in arts activities include many instrumental and choral organizations, student productions in Thompson Theater, craft instruction and facilities in the Craft Center, and the exhibitions of the Visual Arts Program. These activities, many of which are integrated with academic courses, See "Student Services" in this section of the catalog.

HONORS AND SCHOLARS PROGRAMS

UNIVERSITY SCHOLARS PROGRAM

"Man's mind stretched to a new idea, never goes back to its original dimension"
- Oliver Wendell Holmes.

Holmes was right, of course, and the University Scholars Program (USP) of North Carolina State University accepts this dictum as a challenge: To provide promising, academically talented students with a variety of mind-stretching and unique educational experiences, both in and outside of the classroom, and to encourage these outstanding students to perform at the highest level of achievement of which they are capable.

Co-sponsored by University Housing in the Division of Student Affairs, the First Year College, the School of Design and the Colleges of Agriculture and Life Sciences, Education and Psychology, Engineering, Forest Resources, Humanities and Social Sciences, Management, Physical and Mathematical Sciences, and Textiles, the USP combines special academic offerings with a series of cocurricular and extracurricular opportunities. To successfully complete the USP a student must graduate with an overall Grade Point Average of at least 3.250, complete a minimum of 21 hours of Honors/Scholars courses with an "Honors GPA" of at least 3.000, and satisfactorily participate in the USP Forum Series.

Students in the USP may enroll in special Honors or Scholars sections of basic courses in the humanities and social sciences, mathematics and natural sciences. These sections are deliberately kept small and are taught by instructors known for their excellence in teaching. All of these classes fulfill requirements for graduation from NC State, thus students are not required to take additional courses in order to participate in the USP. To ensure that University Scholars are able to register for their required Scholars Forum, Honors and Scholars courses, and regular, non-Scholars sections of courses, USP participants receive "Scholars Advanced Scheduling" privileges.

Academic work in the Scholars Program is complemented and enriched by a series of special events, called the Scholars Forum. These weekly activities are intended to broaden each student's personal, professional, and cultural horizons. Forum events may include conversations with distinguished faculty members, addresses by major public figures, debates and discussions on significant public issues, and visits to museums and historic sites. They may also include introductions to cultural activities, viewing of significant films, and explorations of opportunities open to students for personal growth and foreign study.

University Scholars are also expected to attend cultural events on the NC State campus and in the Raleigh community. Tickets for many of these events are provided as part of the program. Scholars are also provided the opportunity to attend a range of international films and events, both on campus and at the North Carolina Museum of Art. Additionally, the Scholars Council, a body made up of student representatives from each NC State school and college, plans a variety of social activities and special trips for University Scholars, and arranges for USP students to participate in worthwhile community service projects.

To encourage the development of close working relationships and friendships among participants in the USP, Scholars are invited and encouraged to live in the same residence hall, Sullivan, located on West Campus. To assist and communicate effectively with these students, the USP office is also located in Sullivan Residence Hall. Scholars are guaranteed housing on campus as long as they remain active in the USP.

Finally, through the University Scholars Program, NC State is a member and participates in the activities of the North Carolina Honors Association, the Southern Regional Honors Council and the National Collegiate Honors Council.

For more information concerning the USP, contact: University Scholars Program, Box 7316, NCSU, Raleigh, NC 27695-7316, Phone: (919) 515-2353, Fax: (919) 515-7168; e-mail: University_Scholars@ncsu.edu

HONORS PROGRAMS

Honors programs are offered by the Colleges of Agriculture and Life Sciences, Forest Resources, and Textiles and by most departments in the Colleges of Physical and Mathematical Sciences, and Humanities and Social Sciences. Detailed descriptions of the individual honors programs are available in the listings of the relevant college or department. Honors participants benefit from a more individualized and rigorous academic program in their major area of interest. A **minimum of 9 credit hours** in course work at **the 300 level or above** drawn from at least two of the three following categories is required: special courses for honors students, advanced (graduate) courses, and independent studies. To successfully complete the program, students must finish the designated course work and achieve an overall grade point average of at least 3.250.

Students who complete an honors program are recognized by having an "H" beside their names in the commencement program, the phrase "Completed Honors Program in (college, department or major)" on their permanent transcripts, and their names in the Honors Convocation program.

Minimum admission requirement: 3.250 overall GPA and **either** a 3.250 major GPA after at least 9 hours of course work required for the major or other course work approved by the major department **or the recommendation of the faculty.** Many of the individual programs have higher admission requirements. Students who believe they are eligible and are interested in more information about honors program opportunities should contact the Associate Dean for Academic Affairs of their college or school or the Honors Director of their department or the Director of the University Honors Council.

SCHOLARSHIPS

UNIVERSITY ACADEMIC SCHOLARSHIPS FOR ENTERING FRESHMEN

NC State offers a competitive scholarship program for entering freshmen to recognize and to encourage exceptional academic ability and achievement. Graduating seniors of good character and leadership potential who have excelled in their high school academic and extracurricular endeavors may apply for a large number of merit award opportunities at the University. Financial need is not a consideration in the selection of recipients for these merit scholarships.

Each year the office of Merit Awards and Special Scholarships conducts a nationwide competition for approximately 80 universitywide scholarships (available to students entering any academic major). A number of *other* scholarships are also offered through individual colleges and departments. Completion of the John T. Caldwell Scholarship application packet, which consists of the student's application as well as other supporting documents, assures consideration for the 80 university-wide scholarships, including the prestigious John T. Caldwell Alumni Scholarship. It also provides information to the various Colleges for their curriculum-specific scholarships.

In order to be considered for both university-wide and college-based scholarships, applicants need only submit the NC State Undergraduate Admissions Application by November 15, 1999, unlike previous years when a separate merit scholarship application was also required.

Based upon the academic strength of the November 15 applicant pool, a supplemental merit scholarship form will be sent to a select group of applicants planning to enter each of the University's undergraduate colleges. This supplemental scholarship form cannot be requested directly.

The John T. Caldwell Alumni Scholarship is sponsored by the NC State Alumni Association. Caldwell Scholarships, valued at $4,000/year (up to $18,000 for four years) for instate recipients and $7,500/year (up to $32,000 for four years) for out of state recipients, are offered each year. This excellent scholarship seeks students who demonstrate both academic excellence and strong leadership potential. It includes stipends for valuable personal enrichment and internship experiences.

Yearly renewal of the Caldwell and the other Universitywide renewable awards assumes the maintenance of a 3.000 grade point average once a recipient is engaged in fulltime course work at the University.

Many other scholarships, ranging from $2,000 freshmen year awards up to other renewable awards, such as the Caldwells are available in each year's competition.

Again, the application or materials will be mailed to the student after he/she has applied for admission if his/her academic credentials are competitive for the selected pool.

The Office of Merit Awards and Special Scholarships, NCSU, 2119 Pullen Hall, Box 7342, Raleigh, NC 27695-7342

Telephone inquiries are welcome: (919) 515-3671

CURRICULUM-SPECIFIC FRESHMAN MERIT SCHOLARSHIPS

There are a number of merit scholarships for students entering a particular college or major. The number and value of these awards vary greatly throughout the different colleges. The individual college Dean's Office is the best place to inquire for additional information on available awards.

Most of the college-sponsored scholarships have a March 15 date for notification of scholarship decisions—most programs do not request that a special application be filed, just that an undergraduate admissions application with all supporting documents be filed by November 15.

COLLEGE AND DEPARTMENTAL SCHOLARSHIPS FOR CONTINUING STUDENTS

A number of scholarships based upon academic achievement are administered directly through some of the academic departments for students engaged in fulltime course work at the University (see the "Colleges, Departments, and Programs of Study" section of this catalog). A continuing student should contact the college/department of his or her academic major for information about specific scholarship opportunities that do not require the filing of financial information.

EVENING UNDERGRADUATE DEGREE PROGRAMS

The College of Humanities and Social Sciences offers courses toward complete undergraduate degree programs during the evening hours for adult part-time students. Sufficient courses are generally offered in the evening hours to complete majors in communication-public and interpersonal option, communication-public relations option, English, English-rhetoric, writing and language option, history, multidisciplinary studies, political science, sociology, and criminal justice option in political science or sociology. For more information, contact the Coordinator of Evening Programs, College of Humanities and Social Sciences, Box 8101, NC State, Raleigh, NC 27695-8101, (919) 515-3638.

NONDEGREE CERTIFICATE PROGRAMS

Nondegree certificate programs are prescribed sets of regular academic courses which offer limited but structured continuing education opportunities. They are designed expressly for Lifelong Education students. Students enrolled in undergraduate or graduate degree programs at NC State are not eligible to participate simultaneously in these certificate programs. Satisfactory completion of the prescribed courses is recognized by the issuing of a certificate from the department or college that offers that program.

Certificate programs are currently offered by the following academic units: Department of Adult and Community College Education - **Studies in Gerontology** (PBS students only) and **Training and Development** (PBS students only); Department of Communication - **Human Communication**, with track options in Public and Interpersonal Communication, Communication Disorders, Mass Communication, Public Relations, and Theatre; Department of Computer Science - **Computer Programming** (PBS students only); Department of English - **Professional Writing**; Department of Political Science and Public Administration - **Management Development** (PBS students only) with program areas such as Adult and Community College Administration, Data Management, Financial Management, Human Resources Management, Management Control Systems, Public Affairs, Urban Administration, Program Evaluation, Administration of Justice, Recreation Resources Management, and Association/Non-profit Management; and the College of Textiles - **Textiles** with subject areas including Apparel Production, Dyeing and Finishing, Fabric Production, Textile Fibers and Polymers, Fiber Science for Textile Conservators, Textile Administration, Textile Fundamentals, and Yarn Manufacturing.

For information concerning enrollment requirements and prescribed courses for a particular certificate program, consult the department or college offering that program or the Office of Adult Credit Programs & Summer Sessions, (919) 515-2265.

SUPPLEMENTAL INSTRUCTION

Supplemental Instruction (SI) is offered to students in most sections of freshman and sophomore chemistry and selected sections of biology, computer science, mathematics and physics. SI sessions are attended voluntarily by students with a wide range of academic backgrounds and aptitudes. They are open to all students who want to improve their understanding of the course material. Three or four sessions are offered at various times each week, usually during the late afternoon and early evening.

SI sessions give students a chance to get together with peers to compare notes, to discuss concepts, to work problems, and to develop strategies for studying the material. The sessions are led by trained university tutors called SI leaders. Leaders are usually undergraduate students who previously excelled in the course and who have been selected for their outstanding communication abilities. The leaders attend class, take notes, and do homework assignments in preparation for the SI sessions.

During the semester, students may attend as many SI sessions as they wish. Session attendance is recorded for use in data analysis and program improvement. The data reveals a consistent record of higher grades and lower drop-out rates for students who regularly attend. Grades also steadily improve with increased SI attendance. Students attending SI at least once a week average a whole letter grade higher than students who do not attend.

For more information, contact the Undergraduate Studies Tutorial Center, 515-3163.

THE PEER MENTOR PROGRAM

The Peer Mentor Program is a student peer-helper program in which academically talented African-American upperclassmen serve as "mentors" to freshmen African-American students. The program stresses the mentoring process as a positive factor in the successful recruitment, advancement, and graduation of African-American students at this University. The Peer Mentor Program assists the freshmen in making a successful transition to campus life by providing them with a supportive contact person who acts as a sounding board for personal adjustment concerns; interprets University policies and procedures; makes proper referrals to appropriate University services; and suggests to freshmen various strategies for academic, emotional, and

social success at NC State. Moreover, an integral component of the program is a focus on cultural awareness and identity as a means of helping African-American peer mentors and freshmen to positively affirm their skills and capabilities.

All incoming African-American freshmen are assigned a peer mentor prior to their arrival on campus in the fall. Whenever possible, the freshmen are paired with upperclassmen who are in the same major or college. Peer mentors are trained in "helping skills" and possess a working knowledge of the campus. Thus, they play a significant role in fostering in the freshman student a positive self-esteem and an appreciation of the potential benefits and rewards of college life.

COOPERATING RALEIGH COLLEGES

The Cooperating Raleigh Colleges (CRC) is a voluntary organization comprised of NC State, Meredith College, Peace College, St. Augustine's College, St. Mary's College, and Shaw University for the purpose of developing and conducting cooperative educational activities. The organization provides the opportunity for students to enroll at another institution for a course or courses not offered on their home campus. Other activities include a cooperative library arrangement, joint student activities, and faculty cooperation and interchange.

Any NC State *undergraduate degree* student who is enrolled in at least eight credit hours on the NC State campus may take a course at another Raleigh college during a fall or spring semester (except that men may not enroll in courses at Peace College) provided that (a) the course is not taught on the NC State campus and (b) the adviser and dean consider the course educationally desirable.

Students may not register for more than a total of two courses in any semester at other CRC colleges. Under extenuating circumstances, exceptions for an additional course registration may be approved by the requesting student's school dean.

Home campus students have first priority in class assignments. Courses taken at other institutions may be used as free electives and as alternatives to restricted electives, if so approved by the student's adviser and dean. Credits earned in this manner may apply toward fulfilling graduation requirements, but grades from other CRC institutions are not used in computing a student's NC State grade point average. Under this agreement, regular tuition and fees are paid to NC State. Certain special fees may be required for special courses at other colleges, and the student is responsible for paying such fees. During the summer, there is no interinstitutional program with local colleges. A student desiring to take a summer course must register directly with the institution offering the course.

Note: Lifelong Education students may not register for courses as interinstitutional students.

NATIONAL STUDENT EXCHANGE PROGRAM

NC State is one of over 155 colleges and universities in the United States belonging to the National Student Exchange Program. Each year an opportunity is provided for NC State students to study at one of the other participating schools and still pay the same tuition and fees they pay at NC State, thus avoiding the red tape normally associated with a change of school. Students returning from exchange reflect an increased feeling of independence, self reliance and self confidence, and a better appreciation of home region, family and home campus. A major impact of the exchange year has been an increased awareness and appreciation for the vast differences in ideas and values found in different geographic locations. Eligible students must be an undergraduate with a 2.500 grade point average or better and be selected by a screening committee. Preference is given to North Carolina residents. For further information contact the National Student Exchange Office in 2120 Pullen Hall, (919) 515-3499.

NC STATE FELLOWS PROGRAM

NC State offers a self development experience known as the NC State Fellows Program. The program is designed to assist outstanding, talented students to develop their leadership potential at an accelerated pace, and to accomplish this in ways not usually afforded by the University. Each year approximately 30 new freshmen are selected to participate in the program as Fellows. The program seeks to identify students of exceptional ability and motivation and to encourage their development as potential leaders for business, governmental, educational and other professional communities. The program attempts to fulfill its goal by providing training and developmental opportunities.

INTERNATIONAL STUDENTS

About 1,200 international students from approximately 87 countries attend the University and enrich the campus and community. The International Student Office assists these students with immigration and passport matters, currency permits, and medical, personal, and social concerns.

International applicants are carefully screened for evidence of English language proficiency, adequate finances, and academic credentials indicating excellent potential for success. *The minimum TOEFL requirement for admission consideration to NC State is 550 with scores of at least 50 on two sections and no score lower than 45.* The Lifelong Education Student category is not available to persons on temporary visas. The University has authority to issue Forms I20 for F1 visas and Forms IAP66 for J1 visas to fully qualified individuals.

An orientation program for new international students is conducted during the week preceding the fall and spring semesters.

International students are required to purchase the University student insurance policy or provide proof of agency sponsor coverage. Special courses in English for Foreign Students (FLE) are required for those whose scores on the Test of English as a Foreign Language (TOEFL) are sufficiently high for admission but who need further instruction to perform well academically.

The International Student Committee of the Union Activities Board includes international students from across campus, offering and promoting programs of cultural enrichment in an atmosphere of mutual respect and cooperation for members of the campus community from all cultures. Program highlights include International Nights, featuring ethnic meals and entertainment, and Global Speak, a program for conversation partners.

Interested students should contact the Student Center Activities Office, 515-2451, or the Union Activities Board, 515-5918.

SUMMER INSTITUTE IN ENGLISH FOR SPEAKERS OF OTHER LANGUAGES

The Summer Institute in English for Speakers of Other Languages is a five-week, intensive English language program for students from other countries. It is especially good for students who intend to pursue university studies or specialized training programs in the United States in the fall. The institute, which is jointly sponsored by the Department of Foreign Languages and Literatures and the Division of Continuing Education, is held from early July to early August each summer. It is designed to provide students with intensive instruction and practice in the use of the English language. Emphasis is on developing integrated oral and written skills in English.

The institute also offers orientation to American life and institutions to give students insight into life in the United States and to help them to adjust to the new environment. There are films, lectures by guest speakers, and field trips on weekends to places of historic, cultural, and scenic interest.

Prospective students usually have studied English and have some experience with spoken English prior to enrolling in the institute. However, all levels from beginners to advanced are welcome.

Admission to the institute does not imply admission as a degree candidate at NC State or any other campus of the University of North Carolina System.

The TOEFL (Test of English as a Foreign Language) is administered to students who wish to take it at the end of the program. Since this is an institutional administration of the test, scores are only accepted by the Admissions Office and Graduate School at NC State.

For information, contact Dr. John Levis at 515-9299 or levis@social.chass.ncsu.edu

ALEXANDER INTERNATIONAL PROGRAM

The Alexander International Program is a residence hall community for both American and international students. The 174 resident members of the program share the common goal of developing their understanding of different cultures and countries and developing crosscultural relationships. The 87 American students and the equal number of international students, representing approximately 40 foreign countries, become more sensitive to the values of different peoples, systems of government, economic structures, and religions. These goals are achieved through informal interactions, social and educational programming, and American and international roommate pairing.

Program activities in past years have included both an international dinner and international coffeehouse series, emphasizing customs, foods, and entertainment from various cultures. Workshops on cultural differences, crosscultural communication

and relationships, international employment opportunities, and overseas studies are regularly included in the annual calendar of programs and activities. These activities provide an opportunity for American students to add an international dimension to their education while attending NC State.

Participation in this international program is selective and based upon potential contributions to the program. Students are expected to be active participants, to initiate programming, and to be supportive of the program goals. Students interested in applying or wishing additional information should inquire at 105 Alexander International Hall, (919) 515-2925.

STUDY, TRAVEL, AND SHORT-TERM EMPLOYMENT ABROAD

The Study Abroad Office assists students who would like to study, do an academic internship, volunteer, or work in another country. Opportunities are available for the summer, semester, or year, and many programs cost about the same as studying at NC State. The Study Abroad Office administers approximately $30,000 dollars in campus based scholarships for study abroad each year, in addition to national scholarship competitions such as Fulbright and NSEP. Students may also use their financial aid to study abroad.

STUDY PROGRAMS

Study programs abroad allow students to take course work overseas in their major and/or minor field, and/or fulfill general education requirements. Programs are available for the summer, the semester, or the year. Many programs have no foreign language requirement. There are four basic types of study abroad programs at NC State.

NC State Exchange Programs are available in England, the Netherlands, Sweden, Germany, France, Finland, Costa Rica, Japan, and Australia. There are also special School of Design exchanges in several locations. Students on these exchanges pay regular NC State tuition. Room and board costs are paid to the host institution, but are typically very similar to those at NC State. Requirements include a GPA of at least 2.750 (some exchanges require a 3.000) and, for programs in Germany, France, and Costa Rica, completion of at least the 202 level of language study.

ISEP Exchange Programs are available in over 30 countries in Asia, Africa, Europe, and Latin America. Students on these exchanges pay regular tuition, room, and board to NC State. Requirements include a GPA of at least 2.750 and at least intermediate level (through 202) language proficiency for programs in which the language of instruction is not English.

NC State Study Abroad Programs are available in Ghana (West Africa), India, and Spain. In addition, Internship/Study programs which combine classroom study with internships for academic credit are available in the Dominican Republic and, through the EPA program, in Spain, France, Germany, Belgium, England, and Australia. Students on these programs pay a set program charge for tuition, housing, and meals. The costs are usually somewhat more than instate, but less than out-of-state tuition at NC State. Requirements include a GPA of at least 2.750 and for programs in Spain, France, and Germany, completion of at least the 202 level of language study.

NC State Summer Programs are available in more than a dozen locations each summer. NC State programs are directed by NC State faculty and offer NC State course credit and grades. Students on these programs pay a set program fee which generally covers tuition, housing, some meals, and excursions, although the details vary from program to program. Eligibility requirements vary, but many programs are open to students in good academic standing who have completed the freshman year. Students typically earn 6 hours of credit on summer programs. The programs below will be offered in the summer of 1999. For the list of programs for the current year contact Assistant Director, Anne Haberkern in the Study Abroad Office, Box 7344.

GREAT BARRIER REEF, AUSTRALIA. This program offers NC State students an opportunity to study tropical field ecology on Australia's Great Barrier Reef and combines the study of ecological theory with practical research in one of Earth's richest biological systems. Participants wanting credit may enroll in either an undergraduate course in Agriculture and Life Sciences or a graduate course in Zoology. Study is done at the Heron Island Research Station, a small island at the southern end of the Great Barrier.

VIENNA, AUSTRIA. This program offers five courses taught in Vienna during the month of July: the Arts of Vienna, Vienna and Its Relation to East Central Europe and the European Union, Contemporary Science and Human Values (using Vienna as a case study), and two German-language courses. The first three courses are taught in English. Students live in a residence near the city center. The program includes a four-day trip to Prague and Budapest as well as an excursion to the castles and monasteries on the Danube. Most afternoon, evenings and weekends are free to explore one of the world's most beautiful and vibrant cities.

AUSTRIA/EGYPT. This program is designed for students in the University Scholars Program and other NC State students with a GPA of 3.000 or better. It is a unique opportunity for comparative study of a central theme, water, in two very diverse cultures. Courses are HSS 398S Scholars Seminar "Water Works in Austria and Egypt" and MDS 351 "Arts: Ideas and Values." Extensive use of sites, architecture and museums in the two countries are incorporated into the course work.

COSTA RICA. This is a fiveweek program of intensive ethnographic field work focusing on the problems of sustainable ecotourism in Costa Rica, conducted jointly with East Carolina University. Students spend the first week in Costa Rica's beautiful central highlands studying ethnographic methods and learning about the sociocultural and economic issues surrounding Costa Rica's tourism industry. The following four weeks are spent primarily in the region near Manuel Antonio National Park. Students stay in Costa Rican family homes in the town of Quepos. Participants must have at least two semesters of Spanish.

PRAGUE, CZECH REPUBLIC. Located in Prague, one of Europe's most beautiful and historic cities, this 6-week program offers credit hours from the School of Design. Courses in landscape architecture, art and design are offered as studios. Study of architecture and urban planning consists of two 3-credit courses. Some weekend trips and a 4-day excursion through southern Bohemia are included. Cultural events include ballet, opera, jazz and marionette theater performances. Courses are taught in English.

LONDON, ENGLAND. This program provides American-style university-level classroom instruction in the heart of London. NC State professors teach an arts course focusing on the arts, architecture, music and theater of London and a course on the British perspective on the American Revolution. Students reside and study at Canterbury Hall, a University of London residence hall located in the Bloomsbury section, within walking distance of the British Museum, Charles Dickens House, and the theater district. Included in the program are tickets to theater and concert events and day excursions. Optional weekend excursions are available to Paris and Edinburgh.

OXFORD, ENGLAND. This program offers courses entitled Shakespeare, Art Treasures of Oxford, and Britain since 1930, all taught by British instructors. Students reside and study in St. Benet's Hall, a permanent private hall of Oxford University. The program offers several day trips including theater performances in London and the Shakespeare Theater at Stratford on Avon. A country town and industrial center, Oxford is best known as the seat of Oxford University, England's oldest university, and is celebrated for tradition, academic excellence and beautiful architecture.

LILLE, FRANCE. This 6 week French language and European culture program is held at the renowned language institute CLARIFE, located at the Catholic University of Lille. Lille, known as "the Gateway to Europe," is the hub of cross-Channel railroad travel which makes this city readily accessible to most major European destinations. Excursions include Paris and the northeastern French coast. This program is open to students at the 200 level in French.

BARODA, INDIA. This School of Design program provides upperclassmen and graduate students an opportunity to be immersed in the design, culture, and nature of India. It focuses on the study of issues in landscape architecture, urban design and architecture. Based in Baroda in the state of Gujarat. The program includes excursions to sites including Ahmedabad, Rajasthan, the Taj Mahal and New Delhi.

GUBBIO,ITALY. During this 6 week program, design students (including architecture, landscape architecture and graphics students) will have firsthand experience observing and producing works of art in Italy. Students will have opportunities to interact with local artists and artisans in this picturesque hilltown and participate in a studio. Six hours studio credit can be earned.

CUERNAVACA, MEXICO. This language and culture immersion program is located 70 miles south of Mexico City in the city of Cuernavaca, called the City of Eternal Spring because of its mild sunny climate. Students live with Mexican families and attend the Center for Bilingual and Multicultural Studies. This program includes weekend excursions to pyramids, major archaeological sites, historical cities and a recreational weekend in Acapulco. Students may earn up to six credits of Spanish language credit, including beginning, intermediate and advanced level courses.

SANTANDER, SPAIN. This six-week program is available to upper level and graduate students in architecture and landscape architecture, offered jointly with UNC-Charlotte. An intensive studio course focuses on the design of urban spaces. The studio group also has extensive field trips to major Spanish cities and small towns in order to study historical and contemporary examples of architecture, parks, gardens and plazas. Spanish language ability is not required. Students live in the University of Cantabria's residence halls. The courses are taught by professors and professional designers from North Carolina.

GHANA, WEST AFRICA. (Humanities) Offered through the AfricanAmerican Studies Minor program, this program offers course work and immersion in African culture. Courses include "Ghanaian Culture and Society," "History, Politics and Economic Development of Ghana," and "Social and Psychological Health Issues in an African Context." Based at the University of Ghana in Legon, the program will also include a number of excursions. Housing is primarily in family home stay.

GHANA, WEST AFRICA. (Art and Design) Sponsored by the School of Design, this program offers students an opportunity for intensive studio and research work in African art and design, and exposure to the rich history and traditions of Ghana. Based at the College of Art at the University of Science and Technology in Kumasi. Courses offered in ceramics, painting, sculpture, and textiles.

VOLUNTEER AND WORK PROGRAMS

In addition to the academic programs listed above, NC State students may participate in a wide variety of volunteer and paid work options around the world. Most programs operate during the summer months, although some programs during the academic year are available.

INTERNATIONAL STUDENT EXCHANGE PROGRAM

NC State is one of 100 colleges and universities in the United States participating in the International Student Exchange Program. Through ISEP, undergraduate students may attend any of 100 member institutions in Africa, Asia, Australia, Canada, Europe, and Latin America on an exchange student basis for a summer semester or single academic year.

NC State students pay a program fee for their stay abroad which is based on their regular tuition and fees plus the cost of room and board at NC State. Aside from travel expenses and health coverage, ISEP makes it possible for NC State students to study outside the country for the same cost of continuing studies at NC State. This arrangement also allows students to maintain their eligibility for financial aid. While abroad, ISEP students are entitled to all the benefits and services of regular fulltime students at their host institutions. Room and board are provided and an ISEP coordinator on each campus is available to students for assistance with any problem.

To apply to participate in ISEP at NC State a student should have a cumulative grade point average of at least 2.750 and have already studied at NC State for two semesters. Applicants must be proficient in the language of instruction at the study sites they choose. A campus selection committee, made up of faculty members, chooses those applicants as NC State's participants. Applicants are not in competition with each other. The ISEP Selection Committee bases its decision on the feasibility of each applicant's proposed course of study, on academic background, application and references. The selection process for each academic year takes place in the winter of the preceding year. Students begin the application process by requesting a copy of the ISEP Directory from the Study Abroad Office.

NC STATE ADMISSIONS

The "early action" freshman application deadline is November 15. "Early Action" applicants will receive a response by early January but still have until May 1 to confirm enrollment plans. The freshman application priority deadline for the fall semester and summer sessions is February 1; the transfer student priority deadline is April 1. Freshmen are strongly encouraged to apply during the fall of the senior year in high school. All applicants for the School of Design must submit applications by December 1. Applications for the spring semester should be submitted prior to November 1. The School of Design does not admit students in the spring. Each applicant must complete an application form which may be obtained from high school counselors or by writing to:

Director of Admissions
Box 7103
North Carolina State University
Raleigh, North Carolina 27695-7103

Note: A nonrefundable $55 fee must accompany the completed application.

FRESHMAN ADMISSION

Admission to the University is competitive, and it is possible to be admissible to some programs but not to all programs at NC State. Applicants are asked to indicate their first and second choices for a curriculum, including undeclared majors within a college, or, if undecided, to indicate their choice of participating in the First Year College. Applications which are not admissible in the first curriculum choice will be reviewed for admissibility in their second curriculum choice. Transfer between programs after a successful first year may be possible.

The admissions decision is based primarily on the evaluation of the high school record, including the level and difficulty of the courses taken, the overall grade point average, rank in class, and scores on the Scholastic Assessment Test (SAT) or the American College Testing Program (ACT). Extra-curricular involvement and leadership are also considered. These factors are reviewed with the curriculum choice to determine admissibility as a freshman at NC State.

In addition, the Board of Governors of the University of North Carolina System has determined that the minimum undergraduate admissions requirements for all constituent institutions, including NC State, shall be: - A high school diploma or its equivalent - English - four course units in English, emphasizing grammar, composition, and literature - Mathematics - three course units in math, including algebra I, algebra II, and geometry, or a higher level math course for which algebra II is a prerequisite - Social Studies - two course units in social studies, including one unit in United States history - Science - three course units in science, including at least one unit in a life or biological science; at least one unit in a physical science (for

example, physical science, chemistry, or physics) and at least one laboratory course. Prospective students must complete at least two course units in one foreign language. It is recommended that every student take a foreign language course and a mathematics course in the twelfth grade. *Any additional entrance requirements for admission to NC State will be set forth in the Freshman Admissions Bulletin for that year. Any exceptions to University admissions requirements must be approved by the faculty members of the University Undergraduate Admissions Committee.*

Applicants are accepted on either junior or senior test scores, although senior scores are recommended, especially if the applicant is also applying for financial aid or scholarships. An interview is not required and does not weigh in the admissions decision; a prospective student is always welcome to visit the Admissions Office, 112 Peele Hall. The Admissions Office conducts freshman information sessions every Monday, Wednesday, and Friday at 10:30 a.m. and on Tuesday and Thursday at 1:30 p.m. Campus tours led by students are conducted each weekday, weather permitting, at 12:20 p.m., starting at the Memorial Bell Tower.

Two-Year Agricultural Institute
Requirements for admission to the Agricultural Institute, a two-year terminal program, include graduation from an accredited high school or successful completion of the high school equivalency examination administered by the State Department of Public Instruction. The application should include either a copy of the high school record or a letter indicating the applicant has passed the equivalency examination. Each application is reviewed and evaluated by the Institute Director. SAT scores are not required but are recommended. Course work is not transferable into the four year degree programs. Completion of the Agricultural Institute leads to an Associate of Applied Science (AAS) degree. (See College of Agriculture and Life Sciences).

Standardized Test Scores
Applicants for admission as freshmen must submit scores from the College Board Scholastic Assessment Tests (SAT) or the American College Testing Program (ACT). Students should request that their scores be sent directly from the testing service to NC State. (SAT Code #5496, ACT code #3164) Information booklets and application forms may be obtained from school counselors or by writing directly to the testing services:

SAT address: The College Board ATP
Box 592
Princeton, New Jersey 08541
ACT address: ACT Records Department
P.O. Box 451
Iowa City, Iowa 52243-0451

SAT II (Achievement Tests)
Freshman students must present SAT II Mathematics Subject Test scores to ensure proper math placement at NC State. Students should take the Level II-C test.

Advanced Placement (AP) / International Baccalaureate (IB)
A student may qualify for advanced placement by one or more of the following means: (1) by passing a proficiency examination administered by a teaching department at NC State; (2) by attaining a score of 670 or higher on the verbal portion of the SAT; (3) by meeting a specific minimum score on certain of the Advanced Placement Program (AP) or IB examinations; and (4) by attaining a minimum score on certain of the College Level Examination Program (CLEP) subject tests.

OUT OF STATE STUDENTS

Undergraduate applicants from outside North Carolina may be required to meet more competitive standards for admission than North Carolina residents. NC State is limited to accepting not more than 18 percent of total new undergraduate students from outside the state.

TRANSFER STUDENTS

NC State welcomes transfer applicants, and in recent years, more than 25 percent of our graduates started their college programs at other institutions. A transfer student should present at least 30 semester hours (or 45 quarter hours) of "C" or better college level work, including an English class and a college level math class applicable to the degree program. The grade point average required varies, depending upon the requested program of study. Additional specific course work is required for some programs. Transfer students must be eligible to return to each institution previously attended and must submit individual transcripts from each institution.

Students who graduated from high school since 1990 must submit a high school record to verify that they have met minimum admissions requirements for course work as outlined in the Freshman Admissions section of this catalog. Exceptions to this requirement are students who will have earned an A.A., A.S. or A.F.A. degree before enrolling at NC State. Individuals who

do not have the minimum admissions requirements at the high school level must complete at the college level six semester hours or nine quarter hours each of English, mathematics, science and social science to be eligible to transfer.

Once applicants have been accepted, their transcripts are evaluated for credit that is transferable to the University. The college to which application is made will determine the exact amount of credit applicable toward a degree at NC State. A grade of C or better is required before a course may be considered for credit.

Transcripts are not evaluated until the applicant has been admitted. International students are carefully screened for evidence of English language proficiency, adequate financial backing and academic credentials indicating potential for success.

UNCLASSIFIED STUDENTS

Unclassified students are those working for college credit but not enrolled in a degreegranting program. Admission as an unclassified student requires the recommendation of the dean of the school in which the student wishes to enroll. Unclassified students must meet the same entrance requirements as regular degree students and must meet the same academic requirement to continue. If, at a later date, unclassified students wish to change to regular status, their credits will be evaluated in terms of the requirements of their intended curriculum.

LIFELONG EDUCATION STUDENTS

The Lifelong Education student classification is designed for residents of the Triangle area who have not been formally admitted into a degree program at the University but who wish to enroll in courses offered by the University. Lifelong Education students are limited to a maximum course load of two courses plus one physical education course each semester or summer session.

Lifelong Education student applications should be made through the Office of Adult Credit Programs & Summer Sessions, at the McKimmon Center, corner of Western Boulevard and Gorman Street. If Lifelong Education students wish to become undergraduate degree candidates at a later date, they must make application through the Office of Undergraduate Admissions and are encouraged to make an appointment with that office to discuss entrance requirements. Lifelong Education students wishing to become graduate degree candidates must make application through the Graduate School and should consult the Graduate Administrator in the chosen field of study for advice or clarification of information.

SERVICEMEN'S OPPORTUNITY COLLEGES

NC State has been designated as a member of the Servicemen's Opportunity Colleges (SOC) General Registry - a network of institutions sponsored by the American Association of State Colleges and Universities and the American Association of Community and Junior Colleges. Servicemen are encouraged to take college level courses offered by accredited institutions and made available to military personnel through SOC. Records are evaluated, files are retained, counseling is provided, and recognition is given for learning through noninstitutional sources when appropriate. Transcripts must be sent to the Director of Admissions directly from the institution offering the course.

COLLEGE LEVEL EXAMINATION PROGRAM (CLEP)

A national program administered by the College Board, CLEP is a series of examinations that allows students to show knowledge in a wide range of areas. The tests are used to grant credit for corresponding college courses. There are five General and 30 Subject Examinations. At NC State credit is granted primarily for Subject Examinations, as these provide a more satisfactory evaluation of subject matter covered in NC State courses. Scores and essays, if required, are reviewed and credit granted by the department offering the corresponding course. Information regarding credit can be obtained in the Registrar's Office, 1000 Harris Hall, (919) 515-2576.

Both General and Subject Examinations at NC State are administered during the third calendar line of each month except December and February. It is necessary to register for the examinations at least three weeks before the first of the week in which they are to be given. The examinations are administered through the Counseling Center at North Carolina Central University, Durham, North Carolina, (919) 683-6336.

GRADUATE STUDENTS

Procedures and policies governing graduate admission are outlined in a separate catalog issued by the Graduate School. For a copy of the *Graduate Catalog* write:

Dean of the Graduate School
104 Peele Hall, Box 7102
North Carolina State University
Raleigh, North Carolina 27695-7102

NEW STUDENT ORIENTATION PROGRAM

Leazar Hall
Roger A. E. Callanan, *Director*
Roxanna S. McGraw, *Assistant Director*

New Student Orientation provides assistance to newly admitted first year and transfer undergraduate students in their introduction and transition to the university experience. Guided by orientation professionals assisted by a well-trained staff of current students, orientation sessions coordinate student access and interaction with both academic and student affairs' resources, procedures and opportunities, including academic advising and course registration. In addition to one-day and two-day orientation sessions which are required of all new students, New Student Orientation coordinates the WolfStop information program and the Student Success Institute. These resources, in combination with traditional orientation programming, provide multiple points of informational access and personal assistance

REQUIRED IMMUNIZATION DOCUMENTATION

North Carolina state law requires all new enrollees in the university system to present proof of immunization prior to completion of registration.

Verified proof of immunization against rubella, measles, tetanus and diphtheria must be presented to the University Student Health Service no later than the first day of classes. Also required is a PPD skin test within 12 months of the first day of classes. If this requirement is not met, dismissal from school is mandatory under the law. For assistance, contact Student Health Services, (919) 515-7233.

REGISTRATION

Registration is conducted by using either the **TELEPHONIC SYSTEM** or the Web **TRACSLINK**. A *Schedule of Courses* is available for every semester prior to the beginning of the registration period. This contains all necessary instructions for completing registration.

Registration consists of three steps: (1) meeting with advisers to determine course requirements and to obtain a Personal Identification Number (PIN); (2) registering for courses using the TRACS system; and (3) paying tuition and fees and all other debts to the University by the established deadlines. Instructions for completing registration are issued each semester and summer session.

For more information, contact the Department of Registration and Records, 1000 Harris Hall, (919) 515-2572.

INTERINSTITUTIONAL REGISTRATION

A regularly enrolled undergraduate degree student who is enrolled in at least eight credit hours at NC State may take, under certain conditions, course work at one of the Raleigh colleges, at the University of North Carolina at Chapel Hill, at the University of North Carolina at Greensboro, at Duke University, or at North Carolina Central University. Interinstitutional registration forms and all registration procedures are available from the Department of Registration and Records.

SCHEDULE CHANGES - DROPS AND ADDS

Courses may be added during the first two weeks of a regular semester. All courses may be dropped without regard to course load during the first two weeks of a regular semester. During the third and fourth weeks of a semester, fulltime undergraduate students who wish to drop courses at any level and whose academic load would thereby fall below the twelve hour minimum course load may do so only for documented medical reasons or other verified, unforeseen grounds of personal or family hardship.

For undergraduate students, exceptions to the drop policies require the recommendation of a student's adviser (or the departmental coordinator of advising or the department head) and approval by the student's dean. Students who wish to drop all courses for which they are enrolled, must withdraw from the University for the remainder of the semester or summer term in which they are enrolled. A degree student who finds it necessary to drop all courses will initiate withdrawal from the University at the Counseling Center, Student Health Center, 2815 Cates Avenue, 2nd floor.

NC STATE TUITION AND FEES

North Carolina Resident - $1,182.00 per semester (effective 1998-99 academic year)

Nonresident - $5,765.00 per semester (effective 1998-99 academic year)

A statement of tuition and fees is mailed to each pre-registered student before the beginning of any term. The statement must be returned with full payment or complete financial aid information by the due date appearing on the statement. Normally, the due date is two weeks before classes begin. Non-pre-registered students are required to pay their tuition and fees plus late fees during late registration. Fees are the same for both residents and nonresidents and are required of all students. Nonresident students are required to pay an additional $4,583 per semester for tuition.

ESTIMATED ANNUAL UNDERGRADUATE EXPENSES

Tuition and Fees	First Semester	Second Semester	Full Year
N.C. Residents	$ 1,182	$ 1,182	$ 2,364
Out of State Residents	$5,765	$5,765	$11,530
Room Rent	$1,045	$1,045	$2,090
Meals	$1,010	$1,010	$2,020
Books and Supplies	$300	$300	$600
Other personal expenses	$525	$525	$1,050
Transportation	$200	$200	$400

Total

Tuition and Fees	First Semester	Second Semester	Full Year
N.C. Residents	$4,262	$4,262	$8,524
Out of State Residents	$8,845	$8,845	$17,690

NOTES:

1. Tuition and fees are fixed items of cost.
2. Room rent is shown as main-campus, double occupancy rate.
3. Meals, books and supplies, other personal expenses, and transportation are shown as estimates.

EXPENSES OTHER THAN TUITION AND GENERAL FEES

Application Fee: A nonrefundable fee of $55 must accompany each application for admission.
Room Rent: New incoming students receive room reservation instructions in the letter of acceptance. Continuing students are provided a card with instructions at their residence hall rooms. The 1998-99 charge for room rent ranged from $925 per semester for most residence halls to $1210 for North Hall, Wood Hall, and Watauga Hall.
Meals: During their first academic year, new freshmen electing to reside on campus are required to participate in one of the University's available meal plans. Meal plan costs in 1998-99 range from $585 to $1,160. Other students pay for meals individually at the various dining facilities available both on and near the campus.
Books and Supplies: Books and supplies are usually purchased during the first week of classes directly from the Students Supply Stores. Allow approximately $300 per semester for purchasing books and supplies.
Personal Expenses: Personal expenses vary widely among students but the estimate of $525 is based on what students report that they spend on these items.
Administrative Management Fee: A special administrative management fee of $250 per semester and $150 per summer session is required from a contracting agency sponsoring international students whose programs are coordinated through the University's Office of International Visitors.
Cooperative Education Program Fee: Required of all participating coop students for each semester in which they are enrolled in an offcampus work assignment. This fee, set at $338 for the 1998 fall semester, the 1999 spring semester, or the combined 1999 summer sessions, is used for partial support of the Cooperative Education Program staff in job development and placement activities. Students paying this fee are entitled to all University services, facilities, and programs during the semester or combined summer sessions for which they are enrolled.
College of Engineering Computing Fee: All students enrolled in the College of Engineering, both graduate and undergraduate, will be billed a $45 per semester fee to support the Engineering Computing Facility. Payment of the fee will provide students with access to standalone workstations which comprise the Engineering Computing Facility.

Students who enroll in a co-op work session will not be billed for the Computing Fee unless they also enroll in NC State courses.

REQUIRED FEES

Required fees are levied for services, facilities, and programs available to all students whether or not the student takes advantage of them. Students are assessed fees based on the course load they are taking. An itemization of required fees and other detailed information concerning expenses or related data can be obtained by contacting the University Cashier's Office, NC State, Box 7213, Raleigh, North Carolina 27695-7213, (919) 515-2986, or toll free: (888) 627-8826.

REFUND POLICY

Refunds for official withdrawals from NC State University are prorated based upon the percentage of the enrollment period attended. No refunds are made for official withdrawals after 50 percent of the enrollment period. The prorated withdrawal schedule for each semester is publicized through university media after it is established. In some instances, circumstances justify the waiving of rules regarding refunds. An example might be withdrawal because of sickness. Students have the privilege of appeal to the Fee Appeals Committee when they believe special consideration is merited. Applications for such appeals may be obtained from the University Cashier's Office, 1101 Pullen Hall.

RESIDENCE STATUS FOR TUITION PURPOSES

The basis for determining the appropriate tuition charge rests upon whether a student is a resident or a nonresident for tuition purposes. Each student must make a statement as to the length of his or her residence in North Carolina, with assessment by the institution of that statement to be conditioned by the following.

Residence.

To qualify as a resident for tuition purposes, a person must become a legal resident and remain a legal resident for at least twelve months immediately prior to classification. Thus, there is a distinction between legal residence and residence for tuition purposes. Furthermore, twelve months legal residence means more than simple abode in North Carolina. In particular, it means maintaining a domicile (permanent home of indefinite duration) as opposed to "maintaining a mere temporary residence or abode incident to enrollment in an institution of higher education." The burden of establishing facts which justify classification of a student as a resident entitled to instate tuition rates is on the applicant for such classification, who must show his or her entitlement by the preponderance (the greater part) of the residentiary information.

Initiative

Being classified a resident for tuition purposes is contingent on the student's seeking such status and providing all information that the institution may require in making the determination.

Parents' Domicile.

If an individual, irrespective of age, has living parent(s) or court appointed guardian of the person, the domicile of such parent(s) or guardian is, prima facie, the domicile of the individual; but this prima facie evidence of the individual's domicile may or may not be sustained by other information. Further, nondomiciliary status of parents is not deemed prima facie evidence of the applicant child's status if the applicant has lived (though not necessarily legally resided) in North Carolina for the five years preceding enrollment or reregistration.

Effect of Marriage.

Marriage alone does not prevent a person from becoming or continuing to be a resident for tuition purposes, nor does marriage in any circumstance insure that a person will become or continue to be a resident for tuition purposes. Marriage and the legal residence of one's spouse are, however, relevant information in determining residentiary intent. Furthermore, if both a husband and his wife are legal residents of North Carolina and if one of them has been a legal resident longer than the other, then the longer duration may be claimed by either spouse in meeting the twelve month requirement for instate tuition status.

Military Personnel.

A North Carolinian who serves outside the State in the armed forces does not lose North Carolina domicile simply by reason of such service, and students from the military may prove retention or establishment of residence by reference, as in other cases, to residentiary acts accompanied by residentiary intent.

In addition, a separate North Carolina statute affords tuition rate benefits to certain military personnel and their dependents even though not qualifying for the in-state tuition rate by reason of twelve months legal residence in North Carolina. Members of the armed services, while stationed in and concurrently living in North Carolina, may be charged a tuition rate lower than the out-of-state tuition rate to the extent that the total of entitlements for application tuition costs available from the federal government, plus certain amounts based under a statutory formula upon the in-state tuition rate, is a sum less than the out-of-state tuition rate for the pertinent enrollment. A dependent relative of a service member stationed in North Carolina is eligible to be charged the in-state tuition rate while the dependent relative is living in North Carolina with the service member and if the dependent relative has met any requirement of the Selective Service System applicable to the dependent

relative. These tuition benefits may be enjoyed only if the applicable requirements for admission have been met; these benefits alone do not provide the basis for receiving those derivative benefits under the provisions of the residence classification statute reviewed elsewhere in this summary.

Grace Period.

If a person (1) has been a bona fide legal resident, (2) has consequently been classified a resident for tuition purposes, and (3) has subsequently lost North Carolina legal residence while enrolled at a public institution of higher education, that person may continue to enjoy the instate tuition rate for a grace period of twelve months measured from the date on which North Carolina legal residence was lost. If the twelve months ends during an academic term for which the person is enrolled at a State institution of higher education, the grace period extends, in addition, to the end of that term. The fact of marriage to one who continues domiciled outside North Carolina does not by itself cause loss of legal residence marking the beginning of the grace period.

Minors.

Minors (persons under 18 years of age) usually have the domicile of their parents, but certain special cases are recognized by the residence classification statute in determining residence for tuition purposes.

(A) If a minor's parents live apart, the minor's domicile is deemed to be North Carolina for the time period(s) that either parent, as a North Carolina legal resident, may claim and does claim the minor as a tax dependent, even if other law or judicial act assigns the minor's domicile outside North Carolina. A minor thus deemed to be a legal resident will not, upon achieving majority before enrolling at an institution of higher education, lose North Carolina legal residence if that person (1) upon becoming an adult "acts, to the extent that the person's degree of actual emancipation permits, in a manner consistent with bonafide legal residence in North Carolina" and (2) "begins enrollment at an institution of higher education not later than the fall academic term following completion of education prerequisite to admission at such institution."

(B) If a minor has lived for five or more consecutive years with relatives (other than parents) who are domiciled in North Carolina and if the relatives have functioned during this time as if they were personal guardians, the minor will be deemed a resident for tuition purposes for an enrolled term commencing immediately after at least five years in which these circumstances have existed. If under this consideration a minor is deemed to be a resident for tuition purposes immediately prior to his or her eighteenth birthday, that person on achieving majority will be deemed a legal resident of North Carolina of at least twelve months duration. This provision acts to confer instate tuition status even in the face of other provisions of law to the contrary; however, a person deemed a resident of twelve months duration pursuant to this provision continues to be a legal resident of the State only so long as he or she does not abandon North Carolina domicile.

Lost but Regained Domicile.

If a student ceases enrollment at or graduates from an institution of higher education while classified a resident for tuition purposes and then both abandons and reacquires North Carolina domicile within a 12-month period, that person, if he or she continues to maintain the reacquired domicile into re-enrollment at an institution of higher education, may reenroll at the instate tuition rate without having to meet the usual 12-month durational requirement. However, any one person may receive the benefit of this provision only once.

Change of Status.

A student admitted to initial enrollment in an institution (or permitted to reenroll following an absence from the institutional program which involved a formal withdrawal from enrollment) must be classified by the admitting institution either as a resident or as a nonresident for tuition purposes prior to actual enrollment. A residence status classification once assigned (and finalized pursuant to any appeal properly taken) may be changed thereafter (with corresponding change in billing rates) only at intervals corresponding with the established primary divisions of the academic year.

Transfer Students.

When a student transfers from one North Carolina public institution of higher education to another, he or she is treated as a new student by the institution to which he or she is transferring and must be assigned an initial residence status classification for tuition purposes.

Note: General Statute (G.S.) 116143.1 is the prevailing statute governing residence status classification. Copies of the applicable law and of the implementing regulations are available for inspection in the Office of Undergraduate Admissions, 112 Peele Hall. This information is subject to change.

NC STATE FINANCIAL AID

To be considered for assistance by the Office of Financial Aid, a student and his or her parents must complete the federal government's *Free Application for Federal Student Aid* (FAFSA) available from high school guidance offices as well as the NC State Office of Financial Aid. This form must be submitted to the federal student aid processing center for evaluation of the family's ability to pay for educational expenses. Students who submit FAFSAs to the federal processor by March 1 are considered on-time applicants and are given first priority for need-based scholarship and grant consideration. In addition to the FAFSA, entering freshmen are encouraged to complete the College Scholarship Service's PROFILE application in the fall of their senior year in high school and have the results of that application sent to NC State. The PROFILE application provides early need analysis information needed by the university in making early scholarship commitments for which need and merit are factors.

By completing the FAFSA, undergraduates are given consideration for all forms of federal financial assistance, including the Federal Pell Grant, as well as most types of state and institutional financial aid (except for departmental and university merit awards, which often require separate applications). Most financial aid awards are made based on the applicant's financial need, satisfactory academic progress, and timely submission of the FAFSA. Determination of the applicant's need is based on estimated educational costs as established by the Office of Financial Aid and a consideration of the family's financial strength, as determined by the analysis of the FAFSA.

Aid is available on a non-discriminatory basis to all qualifying students. Financial aid awards are usually made in the form of "packages" which consist of a combination of gift aid (scholarships and grants), loan, and/or campus employment through the Federal Work-Study program. These aid packages include aid from all sources, including the federal government, state and institutional funds, and private entities. Students must reapply for aid each year, and renewal is based on continued financial need as well as satisfactory academic progress as defined by the *Policy on Satisfactory Academic for Financial Aid Eligibility.*

A brochure giving a detailed explanation of the aid application and financial aid award process, as well as types of aid available, may be obtained from the office of Financial Aid, 2005 Harris Hall, (919)515-2421.

OTHER OFFICE OF FINANCIAL AID SERVICES

Short Term Loans – Short term loans are available in small amounts (usually not exceeding $1000) to full-time enrolled students with previous good repayment records. These loans are generally approved and disbursed in the same day, and are intended to provide financial assistance to meet unexpected expenses. Short-term loans generally must be repaid within 30 days or by the end of the term, whichever comes first.

Student Employment Service – The Office of Financial Aid coordinates an employment service to assist students with information about part-time academic year or summer employment possibilities. No particular academic or financial qualifications are required to obtain jobs on or off campus (Note: Federal Work-Study jobs are need-based and are not included in this listing). A current listing of job openings is maintained by the Office if Financial Aid and under student employment on NC State's home page.

NC STATE STUDENT HOUSING

RESIDENCE HALLS

The University operates twenty residence halls across campus for almost 7,000 residents. A variety of residential options are available to accommodate diverse student interests and needs. The residence halls are located across campus, offering single gender and co-ed options in buildings ranging in age from Watauga Hall (1906) to Wood Hall (1983). Each hall is different, with amenities such as computer rooms, laundry rooms, kitchens, and air conditioning available. The professional and student staff members recognize the needs of the residence hall population and strive to provide a challenging yet supportive atmosphere fostering academic success, as well as individual and interpersonal growth.

To be eligible to live in the residence halls during the fall and spring semesters, undergraduate students must be enrolled in at least nine credit hours, while graduate students must maintain at least six credit hours. Students who need to enroll in fewer hours, or who must drop below these minimum requirements during the semester, should contact the University Housing office to request that an exception be made. In certain cases, students may be required to submit a letter of support from their advisor. During the summer sessions, university housing is provided for any enrolled student as space permits.

For more information about campus residence halls, contact University Housing, 1112 Pullen Hall, Box 7315, NC State, Raleigh, NC 27695, or call (919) 515-2440.

EDWARD S. KING VILLAGE

The University owns and operates 295 apartments (efficiency, one-bedroom, and two-bedroom units). Eligibility to live in the Edward S. King Village is contingent upon being a full-time student at NC State and one of the following: married and living with a spouse and/or children; a single parent living with a child or children for the duration of occupancy; graduate student; married student unaccompanied by spouse or children; or nontraditional undergraduate student.

E. S. King Village staff and the Village Council implement programs and activities for students, spouses, and children. Recreational areas, playground equipment, and other facilities have been enhanced recently to support the family community atmosphere.

Note: Due to the attractiveness of E. S. King Village, there is usually a waiting list for applicants.

OFF-CAMPUS HOUSING

The University Housing maintains self-help listings of off-campus apartments, rooms, and houses for rent. These listings are not published, but are available in the University Housing Office, 1112 Pullen Hall, during the hours of 8:00 a.m. - 5:00 p.m., Monday through Friday.

The University has no mobile home parking areas, but privately owned mobile home parks are located within a reasonable driving distance of the campus.

FRATERNITIES AND SORORITIES

Twenty of the 26 general college fraternities, and seven of the ten general college sororities chartered at the University maintain chapter houses. Eleven of the fraternities, and four (fall) of the sororities are housed on Fraternity Court, a University-owned project. The remaining fraternities and sororities are located through the immediate campus community.

Rental fees vary in fraternity and sorority houses depending on the individual chapter, but are approximately the same as the residence hall rates.

For more information about Greek housing, contact the chapters directly or contact **Greek Life,** 2110 Harris Hall, Box 3714, NC State, Raleigh, NC 27695-7314, or call (919) 515-2441.

ACADEMIC POLICIES AND PROCEDURES

ACADEMIC ADVISING

Every regularly enrolled student is assigned for academic advising to a faculty member who is normally a member of the department which is, or is most likely to become, the student's major department.

Responsibilities of the Student

Students have the primary responsibility for planning their individual programs and meeting graduation requirements. This involves: keeping up-to-date with university, college, and departmental curricular requirements through materials available from the faculty advisers or departmental coordinators of advising; keeping informed of academic deadlines and changes in academic policies; and consulting with the faculty adviser or departmental coordinator of advising during each registration period, following notification of academic warning status, and at other times as needed and required by academic policy; and diligent in attending class and meeting class objectives and assignments.

Responsibilities of the Faculty Adviser

Although students have the primary responsibility for planning their programs, faculty advisers are expected to: be available for conferences at appropriate times and places about which their advisees have been informed; provide accurate information about academic regulations and procedures, course prerequisites, and graduation requirements; assist students in planning academic programs suited to their interests and abilities and their career objectives; discuss with their advisees appropriate course choices in fulfilling curriculum requirements as well as possible consequences of various alternative course choices: inform their advisees when the advisee's proposed course selections conflict with University academic or curricular regulations; assist advisees with following proper procedures for such things as exceptions to the course drop deadlines, auditing a course before or after taking it for credit, taking a course under the credit by examination policy, registering for 19 or more credit hours, registering for Cooperating Raleigh Colleges (CRC) interinstitutional courses, or repeating a course previously passed; refer their advisees for special testing or counseling as needed; assist their advisees in considering the appropriateness of academic adjustments where these become necessary in cases of serious injury or illness.

Responsibilities of the Coordinator of Advising and Teaching

Each college or department has a coordinator of advising and teaching who is responsible for: assigning, training, and supervising faculty advisers; providing up-to-date, printed course and curriculum information for advisers and students; reassigning to another adviser any student who so requests assisting any student who wants to major in the coordinator's area of study but is ineligible at the time to transfer into it. Students in this category keep their adviser in the department in which they are enrolled but consult additionally with the coordinator of advising and teaching for the department offering the curriculum in which they wish to enroll. Whenever appropriate, the coordinator will advise students that they should consider alternative curricula.

GRADUATION REQUIREMENTS

Students are eligible for graduation when they have completed satisfactorily all the academic requirements of their degree program as specified by their major department, their college, and the university.
NC State requires that, in addition to other university, college, and departmental requirements, all students must have a grade point average of at least 2.000, based on all courses attempted at NC State, in order to be eligible to receive a baccalaureate degree.
Minimum Hours Required for Graduation – Minimum credit hours required in a baccalaureate curriculum that has not been designated a five year program range from 120 to 128. These are shown for each curriculum. Students may take more hours than the required minimum.

Length of Time to Graduation - The normal and expected length of time to graduation is four years (eight semesters) provided the student completes an average of slightly more than 16 credit hours each semester (for most curricula) or attends one or more summer sessions.

By action of the N.C. General Assembly, effective with the 1994 fall semester, new students entering any of the sixteen campuses of The University of North Carolina system (including NC State), will be assessed a 25 percent tuition surcharge once they have attempted more than 140 degree credit hours. (Degree programs at NC State require 128 hours or less for graduation.) Courses taken in summer school at any UNC-System campus do not count toward the 140 hour limitation. Question about this new policy should be directed to the Department of Registration and Records, 515-2572.

In order to make continuous progress toward graduation, students are encouraged to take full advantage of the university's advising and support services. Effective career decision-making and early, deliberate, long-range semester-by-semester planning of courses and careful selection of extra-curricular commitments can provide direction and motivation necessary for effective use of time to graduation.

Additional factors that may assure a student's continuous progress toward graduation include good academic performance in freshman and basic prerequisite courses, advanced placement for introductory courses, and enrollment in summer sessions. Students are discouraged from taking unrealistic course loads as a means to accelerate their progress toward graduation as this may result in poor academic performance.

Students may take more than eight semesters to complete an undergraduate program at NC State. In some cases this is the result of effective decision-making on the part of the student for such things as participation in cooperative education or study abroad programs, a decision to be a part-time student with a reduced course load for reasons of health, necessary outside employment, or parental responsibilities, or attempting dual degrees, double majors, or academic minors.

In other cases the length of time to graduation may be prolonged beyond the eighth semester as a result of incomplete or inadequate secondary school background requiring some additional compensatory, developmental, or prerequisite courses, poor academic performance in the freshman year or early semesters, or late changes of curriculum.

Semester-by-Semester Displays - The requirements for many curricula throughout this section are set forth in semester-by-semester displays. One purpose for these displays is to illustrate how certain sequences of courses and prerequisites may be scheduled. Another purpose is to reflect whether courses are normally offered in the fall or the spring semester. Otherwise, the semester-by-semester displays are merely advisory and not mandatory. The typical semester schedule shown in the displays may not be the appropriate one for many students. Students are required to consult with their faculty advisers prior to registration each semester.

Limited D Grades - Some colleges and departments have established limitations on the use of D grades in certain courses or categories of courses for satisfying graduation requirements.

Grade Point Average in Major - Some departments have established graduation requirements of a grade point average of 2.000 on all courses attempted in the major at NC State or a "C" or better in some or all major courses. Such a requirement is in addition to the university grade point average requirement of 2.000 for all courses attempted at NC State. Students are encouraged to inquire about specific requirements in majors of interest.

Residence Requirements - To be eligible for a bachelor's degree, a student must be enrolled in a degree program at NC State, must have completed at least 25 percent of credit hours required for graduation through courses offered by NC State, and must have earned at least 30 of the last 45 hours of credit through NC State courses. In no case shall the proportion of credit hours taken at NC State and applied towards a bachelor's degree be less than 25 percent. Individual departments and/or colleges may have additional residence requirements.

Note: The College of Engineering has a policy that transfer students normally must earn at least 48 of their last 60 hours of credit at NC State while enrolled as degree candidates.

Note: The College of Management has a policy that Accounting and Business Management majors normally must earn at least 30 credit hours while officially enrolled as a degree candidate in either the ACC or BUS curriculum.

FREE ELECTIVES

All schools and colleges are encouraged to include free electives in their curricula to satisfy their educational objectives. Moreover, students who would like to take courses beyond those required for their degree are encouraged to do so.

CLASSIFICATION OF STUDENTS

Undergraduate degree students are classified according to the number of completed credit hours. The required number of hours of each classification is:

Classification	Semester Hours of Earned Credit
Freshman (FR)	Fewer than 30
Sophomore (SO)	30 or more, but fewer than 60
Junior (JR)	60 or more, but fewer than 92
Senior (SR)	92 or more

Agricultural Institute students are designated as first (01) year if they have earned fewer than 30 semester credits and second (02) year if they have earned 30 or more semester credits.

Unclassified Students (UN) are those working for college credit but not enrolled in a degreegranting program. Admission as an unclassified student requires the recommendation of the dean of the school in which the student wishes to enroll. Unclassified students must meet the same entrance requirements as regular degree students and must meet the same academic requirements to continue. If, at a later date, unclassified students wish to change to regular degree status, their credits will be evaluated in terms of the requirements of their intended curriculum.

The **Special Student (SP)** classification includes Undergraduate Studies and Post- Baccalaureate Studies **(PBS)** students:

Undergraduate Studies (UGS) students are United States citizens who have not obtained a baccalaureate degree and who take courses but who are not currently admitted to a degree program. To be eligible to register as a UGS student, a person should either: (a) have acquired a high school diploma or a GED certificate; not have been suspended from any college or university (including NC State) within the last three years; and not be a degree candidate at NC State; or (b) be a high school student who has been recommended by his/her school and approved by the Undergraduate Admissions Office to take lower level courses. Visiting summer sessions students and visiting interinstitutional students do not necessarily have to meet the above criteria.

PostBaccalaureate Studies (PBS) students are United States citizens who take courses beyond the baccalaureate degree but who are not currently admitted to a degree program. This classification is closed to international students with the following exceptions: (a) spouses of regularly enrolled NC State degree students; or (b) students enrolled in special programs such as AID or FAO who are approved in advance by the International Student Office and the Graduate School.

All **UGS** and **PBS** students must register through the Office of Adult Credit Programs and Summer Sessions which is located in the Jane S. McKimmon Center for Extension and Continuing Education. *Persons found eligible to study as UGS or PBS students are not to assume that they have received formal admission to the University as either undergraduate or graduate degree candidates.* To become a degree candidate, formal application must be made through the Undergraduate Admissions Office or the Graduate School.

The maximum course load for all UGS and PBS students is two courses plus one physical education course each semester or summer session. They may enroll in any course offered by the University, provided they have satisfied any required prerequisites and space is available. The academic standards applicable to undergraduate degree candidates at the University, including the Continuation of Undergraduate Enrollment Policy, apply to UGS and PBS students.

COURSE LOAD

The maximum course load for undergraduate degree students is 21 credit hours a semester and two courses plus a physical education course in a summer session. To carry more than the maximum, students must obtain the approval of their academic adviser and of their college dean. Undergraduate students who propose to register for 19 or more credit hours a semester must obtain approval from their academic adviser. First semester freshmen with admissions indices less than 2.000 and continuing students with a grade point average less than 2.000 should be advised to carry no more than 16 credit hours in a semester.

For Undergraduate Studies (UGS) and Post-Baccalaureate Studies (PBS) students the maximum course load is two courses plus a physical education course in a regular semester or summer session. Exceptions must be approved by the Admissions Office for UGS students and by the Registrar for PBS students..

The minimum course load for fulltime undergraduate degree students is 12 credit hours, except in their final semester when a lesser number may be taken if that is all the student needs to fulfill the requirements for a degree. In order to receive financial aid a student must meet the minimum course load requirements of the appropriate funding agency.

The number of hours for which a student is officially enrolled is that number in which the student is enrolled for credit at the end of the second week of classes (i.e., the last day to withdraw or drop a course with a refund).

GRADING SCALE AND GRADE POINTS

Grade	*Definition*	*Grade Points Per Credit Hour*
A+		4.000
A	Excellent	4.000
A-		3.670
B+		3.330
B	Good	3.000
B-		2.670
C+		2.330
C	Satisfactory ("Passing" for graduate students)	2.000
C-		1.670
D+		1.330
D	Marginal	1.000
D-		0.670
F	Failing	0.000

A grade of C- satisfies a "grade of C or better" prerequisite and other "C-Wall" requirements.

Students classified under the preceding system as SO (or 02) as of the start of Fall 1995 will retain that classification, regardless of whether they have attained 30 hours as of the start of Fall 1995.

GRADE POINT AVERAGE

The number of credit hours attempted in a semester or summer session (for which grades of A, B, C, D (including plus/minus), or F are received) is divided into the total number of grade points earned to arrive at the Grade Point Average (GPA). The Grade Point Average will be calculated to three decimal points.

For example, if a student takes 16 credit hours, earning an A in two 3-credit coursed, a B in one 3-credit course, and a B in one 2-credit course, a C in a 3-credit course, and an F in a 2-credit course, the grade point average would be:

6 (credits of A)	x 4 (grade points per credit hour)	=	24
5 (credits of B)	x 3 (grade points per credit hour)	=	15
3 (credits of C)	x 2 (grade points per credit hour)	=	6
2 (credits of F)	x 0 (grade points per credit hour)	=	0
			45

The total number of grade points earned (45) divided by the number of credit hours attempted (16) equals the grade point average, in this case 20813.

GRADING GUIDELINES

Instructors are expected to inform students, as a part of the course syllabus distributed at the beginning of the semester as to whether the +/- scale or the unmodified (A,B,C,D,F) scale will be used.

Students enrolled in each section of a multiple section course in which the material, the sequencing of its treatment, and the examination are common to all sections should be graded on the same scale.

Exemption

Any student registered in a degree program during a regular semester prior to 1994 Fall Semester will not be subject to the grade point values associated with plus/minus grading as long as the student remains in the same degree level. (There are five degree levels: undergraduate, graduate, professional, Agricultural Institute, and Veterinary Medicine.) Thus, when the teacher of a course chooses to award +/- grades, any +/- grades received by such a student will appear on that student's grade report and transcript, but the grade points used in calculating the students GPA will not reflect the +/- differentials. (Teachers are expected to inform students as a part of their syllabus or outline at the beginning of the course of the grading scale to be used.) This adjustment will be make only for students registered in a degree program. Students who are registered as non--degree students prior to the fall/summer 1994 will be subject to the full grade point range along with students who enroll as a degree student in the fall 1994 semester and thereafter. An exception will be made for students enrolled a Undergraduate Studies (UGS) students who had been enrolled in and subsequently suspended from an undergraduate degree program. These students will be treated as undergraduate degree students for the purposes of this policy.

A student who is not subject to grade point values associated with +/- grading will continue to be so until the student enrolls in a different degree level. For example, a student who is not subject to grade point values associated with +/- grading as an undergraduate student will be subject to grade point values associated with +/- grading upon enrollment in a graduate program. Once the student is subject to grade point values associated with +/- grading, the grade point values associated with +/- grading in all future terms even if the student returns to the student's original degree level.

Whether or not a student is subject to the grade point values associated with +/- grading will not be affected by the length of time enrolled or by breaks in enrollment. Students pursuing additional degrees in the same academic level will maintain their exemption status.

The exemption stated above will end with the 1998 Fall Semester when grade point values associated with +/- grading will be in effect for all students regardless of their initial enrollment date.

The following grades are not used in the calculation of grade point averages.

S	Satisfactory (Credit-only and certain other courses)
U	Unsatisfactory (Credit-only and certain other courses)
CR	Credit by Examination or Advanced Placement
IN	Incomplete
LA	Temporarily Late
AU	Audit
NR	No Recognition Given for Audit
W	Withdraw or Late Drop

DESCRIPTION OF LETTER GRADES

D-Marginal. This grade is used to recognize that a student's performance was marginal but clearly better than that of students who receive an F.

F-Failing. This grade is used to indicate that the student has failed the course.

S-Satisfactory. This grade is used as a passing grade to be awarded only when the quality of the student's work is judged to be C- or higher level. It is used as the passing grade for students who are taking free elective courses under the credit-only option. It may also be used for certain courses such as orientation courses, seminars, and research problems, in which regular grades are not appropriate.

U-Unsatisfactory. This grade is used to indicate that the student is not to receive credit for a credit-only or other course for which the passing grade would be S *(Satisfactory).*

CR-Credit. This grade is used by the registrar to indicate course credit received by examination or advanced placement as certified by appropriate departments or colleges. This grade shall be awarded only when the advanced placement testing indicates that the quality if the student's work in the course would have been expected to be of C- or higher level.

IN-Incomplete. This grade is used as a temporary grade. At the discretion of the instructor, students may be given an IN grade for work not completed because of a serious interruption in their work not caused by their own negligence. *An IN must not be used, however, as a substitute for an F when the student's performance in the course is deserving of an F. An IN is only appropriate when the student's record in the course is such that the successful completion of particular assignments, projects, or tests missed as a result of a documented serious event would enable that student to pass the course. Work undertaken to make up the IN grade should be limited to the missed work.*

An IN grade must be made up by the end of the next regular semester (not including summer sessions) in which the student is enrolled, provided that this period is not longer than twelve months from the end of the semester or summer session in which the work was due. In the event that the instructor or department offering the course is not able to provide a student with the opportunity to make up the incomplete work by the end of the next regular semester in which the student is enrolled or within twelve months, whichever is shorter, the instructor or department offering the course must notify the student and the Department of Registration and Records of the date of the extended deadline for removing the IN grade.

Any In grade not removed by the end of the next regular semester in which the student is enrolled or by the end of twelve months, whichever is shorter, or by the extended deadline authorized by the instructor or the department offering the course and recorded by the Department of Registration and Records will automatically become a Failing (F) grade and will count as a course attempted.

Students must not register again for any courses in which they have IN grades; such registration does not remove IN grades, and the completion of the course on the second occasion will automatically result in an F for the incomplete course.

When a *graduating senior* receives an In, the following procedures apply: (1) if the course *is needed* for graduation, the student will not be allowed to graduate until the work has been made up, and (2) if the course *is not needed* for graduation, the college dean must notify, in writing, the Department of Registration and Records either (a) that the course and the IN grade are to be deleted from the student's record; or (b) that permission has been given for the IN to remain and that a deadline has been established for the completion of the course. In the event that the course is subsequently not completed satisfactorily, the college dean shall notify, in writing, the Department of Registration and Records that the course and the IN grade should be deleted from the student's record or that the IN should be changed to F.

LA-Temporarily Late. An emergency symbol to be used only when grades cannot be reported on time by the teaching department or the professor. The LA differs from the IN grade in that the student receiving the LA has completed the work of the course including the examination.

The LA should not be used by a teaching department or the instructor unless it is absolutely necessary. When it is used the following procedure applies:

1. The Grade Report Roll(s) must be returned at the regularly scheduled time with the LA clearly marked; and
2. A Grade Change Report form must be secured from the Department of Registration and Records, completed, and returned at the earliest possible time and not later than 15 days after the examination.

The semester grade reports of those students who receive an LA will not be complete. This situation often causes students to be uninformed as to their academic eligibility and as to the correctness of their schedule for the following semester.

AU - Audit. Given in recognition of successful completion of a course audit.
NR - No Recognition. Given for unsuccessful completion of a course audit.

Students wishing to audit a course before or after taking it for credit must have the approval of their adviser and of the department offering the course. Auditors are expected to attend class regularly. The degree to which an auditor must participate in class beyond regular attendance is optional with the instructor; any such requirements should be clearly explained in writing to the audit or at the beginning of the semester. Should the instructor conclude that poor attendance has resulted in an auditor's gaining little from the course, the instructor should mark NR (no recognition given for an audit) on the final grade report. Students who have taken a course for audit may, with their adviser's approval enroll in the course for credit during a subsequent semester or summer session. For tuition cost purposes, audits are treated as full credit value. For all other purposes, hours of audit do not count in calculating undergraduate course loads.

Note: Veteran's benefits are governed by Veterans Administration regulation concerning audits. Public Law 94502 (G.I. Bill) and Public Law 64 (sons and daughters of deceased or disabled veterans) consider only courses being taken for credit when determining a student's load for benefit purposes. For information, contact the Veterans Affairs Office, 1000 Harris Hall, (919) 515-3048.

W - Withdrawal/Late Drop. Used on students' grade reports and transcripts to indicate all courses for which they have received official approval to drop or from which they have received official approval to withdraw after the deadlines for dropping.

CREDIT BY EXAMINATION

Undergraduate students currently registered at NC State (degree, unclassified, or Lifelong Education) may request an examination for course credit in a course whether enrolled in that course or not, under the conditions described below. Students must initiate a request with their adviser (except when a teaching department awards credit based upon group testing for placement purposes). Should the adviser approve, the student must arrange for the examination with the department offering the course. The department may administer the examination in any manner pertinent to the materials of the course. Departments are encouraged to offer credit by examination in all courses but have the prerogative of excluding certain courses which are demonstrably unsuited for credit by examination.

The academic standards for credit by examination will be commensurate with the academic standards for the course. If a student's performance on the examination is judged to be of C- or higher quality, the department will notify the Department of Registration and Records on a Grade Change Report that the student has received Credit by Examination for the course. The Department of Registration and Records will enter the appropriate number of credit hours on the student's permanent academic record. Credits earned through Credit by Examination are not used in the computation of a student's grade point average.

The Department of Registration and Records will post course credit by examination to a student's permanent academic record only if that student is currently registered at NC State. However, if the course credit by examination would enable a student to complete the requirements for a degree, that student would not have to be registered in order to receive the credit.

If a student fails to achieve C- or higher quality work on an attempted credit by examination, no action is required other than the department's notifying the student. However, that student is not eligible for another such examination in the same course.

Once a student has failed a course or has completed for credit or audit more than fifty percent of a course, the student may not attempt credit by examination for that course. Under unusual circumstances, exceptions may be made upon the written recommendation of the student's adviser and the approval of the department offering the course. A student who receives credit by examination in a course in which that student is currently enrolled must officially drop that course no later than midsemester.

CREDIT BY EXAMINATION THROUGH INDEPENDENT STUDIES

Persons who are not currently enrolled on campus and who have gained through study or experience, knowledge of the content of undergraduate credit courses offered through Independent Studies may (with the approval of the Independent Studies staff and the academic department offering a course) receive credit for that course by special examination. Students may request approval to attempt credit by examination by completing and submitting a form available from Independent Studies, The University of North Carolina, Box 1020, The Friday Center, Chapel Hill, North Carolina 27599-1020, (919) 962-1104.

Currently enrolled students are not eligible for credit by examination through Independent Studies. These students should go directly to the appropriate academic department to request credit by examination under the regular procedures in effect on campus.

CREDIT ONLY OPTION FOR FREE ELECTIVE COURSES

Each undergraduate student has the option to count toward graduation requirements a maximum of 12 semester hours in the category of credit-only courses (exclusive of physical education and other courses authorized to be graded on Satisfactory/Unsatisfactory basis). The student may select as credit-only any course offered by the University except those in Military Science and Aerospace Studies. The selected courses must be included under the free elective category of the specific curriculum in which the student is enrolled. The student will be responsible for attendance, assignments, and examinations.

The student's performance in a credit only course will be reported as S (satisfactory grade for credit only course and given when course work is equivalent to C- or better) or U (no credit grade for credit only course). The grade for a credit only course will have no effect on the student's Grade Point Average. The course and its grade will be counted in the cumulative hours attempted. *Credit only courses do not count in the calculation of eligibility for the Semester Dean's List, which requires either twelve hours or fifteen hours of course work for which grade points are earned.*

Lifelong Education students may take on a credit only basis any course for which they satisfy prerequisites. Students should be aware that many graduate and professional schools evaluate credit-only courses for which "U" grades were awarded as failing grades.

TRANSFER CREDIT

Transcripts of college course credit for new transfer students and for NC State students who have taken course work at another institution are evaluated by the dean of the appropriate school to determine how the work applies toward fulfilling the

graduation requirements of each student's intended curriculum. Students admitted to an NC State undergraduate degree program who wish to take courses at another institution must obtain prior endorsement from their academic department and prior written approval from their school dean in order to insure that the transfer credits will apply toward fulfilling specific graduation requirements. Transfer credit is not recorded on former students' permanent records until after they have been readmitted and have re-enrolled.

ACADEMIC HONORS

High ranking students in their freshman year are eligible for membership in *Phi Eta Sigma* and *Alpha Lambda Delta*. Both of these national scholastic honoraries require a 3.500 semester grade point average or better during the first semester or a cumulative average of 3.500 for both semesters during the freshman year. Juniors ranking in the top three percent of their class, seniors ranking in the top six percent of their class, and outstanding graduate students are eligible for election to membership in *Phi Kappi Phi*, the university's most prestigious campus-wide scholastic honor society. Outstanding undergraduate and graduate students majoring in the arts and sciences are also eligible for election to membership in *Phi Beta Kappa*.

Semester Dean's List - A fulltime undergraduate student who earns a semester average of 3.500 or better on 12 to 14 hours of course work for which grade points are earned or a semester average of 3.250 or better on 15 or more hours of course work for which grade points are earned will be placed on the Dean's List for that semester. Students are not eligible for the Dean's List in any semester in which they receive an NC or IN grade. When IN grades are resolved, however, students who are otherwise eligible shall be added retroactively to the Dean's List for that semester. Dean's List recognition shall be noted on the student's semester grade report and permanent academic record.

Graduation with Honors - Undergraduate degree honor designations are:

Cum Laude - for GPA 3.250 through 3.499
Magna Cum Laude - for GPA 3.500 through 3.749
Summa Cum Laude - for GPA 3.750 and above

To be eligible for degree honor designations students must have completed at least two semesters *and* at least 30 credit hours at NC State.

Valedictorian, Salutatorian, and Highest Ranking Scholar in a College - To be eligible for consideration as valedictorian, salutatorian, or highest ranking scholar in a college, an undergraduate student must have received at least 100 academic credits at NC State (including credit by examination, advanced placement credit, and S/U courses.) These 100 credits may include no more than 20 transfer credits through programs officially sponsored by NC State. Specifically, these programs are Cooperating Raleigh Colleges, National Student Exchange, International Student Exchange, NC State sponsored study abroad programs, and the affiliated hospital programs in Medical Technology. All students whose accumulated grade point averages, based on all courses attempted at NC State, make them eligible for one of these honors, shall be so recognized. That is, in the case of ties, more than one student will receive the honor. However, in the case of ties for valedictorian, no salutatorian will be recognized.

GRADE REPORTS

The Department of Registration provides four methods in which students may gain access to term grades:

- **WORLD WIDE WEB** - http://www2.ncsu.edu/ncsu/reg_records/
- **TELEPHONE** - 899-ncsu (6278)
  (Grades are available through **TRACS** at any time while the **TRACS** system is open) Grades are reported within 24 to 48 hours after instructors subnit them to the University Registrar's Office.
  Toll Free - 1-877-MY GRADE (694-6494). Grades are provided toll free and are available telephonically during the exam period until approximately two weeks in the next succeeding semester.
- **IN WRITING** - A printed copy of semester grades will be issued only at the written request or authorization of the student concerned. The written request should by submitted after the first day of classes, but before the last day of classes.
- **IN PERSON** - Students may come in person to the Department of Registration and Records, 1000 Harris Hall, and request a printed copy of grades for their last enrolled term.

Change of Name or Address - It is the student's responsibility to inform Registration and Records of any changes in name or address. Failure to do this may prevent prompt delivery of important University correspondence. News stories about Dean's List students are sent to North Carolina newspapers based on hometown information furnished by Registration and Records.

TRANSCRIPTS OF ACADEMIC RECORD

A transcript is an exact copy of a student's permanent academic record at the time it is issued. A fee of five dollars is charged for each transcript. No official transcript may be issued to or for a student who is indebted to the university until such indebtedness has been paid or satisfactorily adjusted. Official transcripts are issued only upon the written request of the student to Registration and Records, Box 7313, Raleigh, North Carolina 27695-7313.

DOUBLE DEGREES

Students who have satisfactorily completed the requirements for more than one bachelor's degree may, upon the recommendation of their deans, be awarded two bachelor's degrees at the same or at different commencement exercises. To earn two degrees students register in one school or department and, with the cooperation of the second school or department, work out their program to cover the requirements for both. Students must file an approved Double Majors Only Curriculum Change Form with Registration and Records, 1000 Harris Hall. An Application for Degree Form must be submitted for each degree.

INTRACAMPUS TRANSFERS (Curriculum Change)

Undergraduate students wishing to change from one curriculum to another must report to the dean's office of the college offering the curriculum in which entrance is desired and request acceptance into the new college or curriculum.

A student who has attempted fewer than twelve credit hours at NC State may transfer to another curriculum provided that student meets the admission requirements of the intended new curriculum. A student who has attempted twelve or more credit hours at NC State may transfer to another curriculum provided that student is eligible to do so under the intracampus transfer policy which pertains to the intended curriculum.

If acceptance is approved, a Curriculum Change Form will be issued, bearing the signature of the accepting dean. If the former curriculum was in a different college, the Curriculum Change Form should be submitted for the signature of the releasing dean with the request that all records be transferred to the new college and department. From the standpoint of advising, registration, and adding and dropping courses, the student is considered to be in the new curriculum as soon as the Curriculum Change Form is completed and filed with the Department of Registration and Records and the records of the student have been transferred to the new department.

ACADEMIC STATUS

CONTINUATION OF UNDERGRADUATE ENROLLMENT

This policy is effective for all undergraduate students as of the beginning of Fall 1995. See the 1999 Undergraduate Catalog (hardcopy) or view at the following World Wide Web address:
http://www2.ncsu.edu/ncsu/provost/info/publications/ugcat/

Provisions are made for students who were on Academic Warning I ,Academic Warning II, and Probation, and for students who were suspended as of the end of Spring 1995 and who remained suspended as of the end of Summer Session II 1995 are described under the heading "Transition of Continuing Students to the Continuation of Undergraduate Enrollment Academic Policy."

MINIMUM ELIGIBILITY STANDARD

The minimum eligibility for continued enrollment for any undergraduate student is defined as achieving the required cumulative grade point attempted at NC State plus transferred according to the Schedule of Performance Requirements for Continuing Undergraduate Enrollment, referred to hereinafter as the continuation schedule.

Schedule of Performance Requirements For Continuing Undergraduate Enrollment

Credit Hours Attempted at NCSU Plus Credit Hours Transferred	Minimum Required Cumulative Grade Point Average on all Courses Taken at NC State
1-35	1.500
36-47	1.600
48-59	1.700
60-71	1.800
72-83	1.900
84 or more	2.000

Undergraduate students who, at the end of any regular semester, do not meet the minimum standards shown in the continuation schedule will not be allowed to continue their enrollment at the University during subsequent fall and spring semesters, with the following exceptions:

- no student will be suspended until the end of the student's second regular semester at NC State;
- any student who begins a given semester with a cumulative GPA of 2.000 or better will be eligible to continue in the next regular semester in which they seek enrollment regardless of academic performance in that given semester;
- students who are eligible to continue at the end of a spring semester will be eligible to continue into the following fall, regardless of summer session performance;
- students will be eligible to continue their enrollment until they have attempted at least twelve hours at NC State;
- suspended students re-admitted on appeal will be eligible to enroll on Academic Probation.

Every student with a cumulative GPA below 2.000 will be in one of three academic status: Academic Warning, Academic Suspension, or Academic Probation.

ACADEMIC WARNING

Every student who meets the foregoing conditions but whose cumulative grade point average is less than 2.000, the minimum for graduation, will be on Academic Warning Status. The Timely Advising Requirement applies to all students on Academic Warning Status.

ACADEMIC SUSPENSION

Students who do not meet the foregoing conditions for eligibility to continue enrollment will be on Academic Suspension Status. Suspended students may be readmitted automatically as provided in the section on "Readmission of Suspended Students." Suspended students not eligible for automatic readmission may appeal to the University Admissions Committee for readmission; they should be encouraged to do so if they feel that circumstances which led to the academic difficulty have changed or can be better accommodated by the student. If re-admitted, the student will be eligible to enroll for one semester on Academic Probation Status.

ACADEMIC PROBATION

Suspended students may appeal to the University Admissions Committee for readmission on Academic Probation Status for one regular semester. Students will not be considered in good academic standing while on Academic Probation Status. Probationary students are subject to the same timely advising requirements as described above for students on Academic Warning. Those with significant involvement in extracurricular activities should be advised to carefully consider the impact of these activities on their ability to succeed academically during the probationary semester and to make adjustments accordingly. The University Admissions Committee may prescribe additional requirements as a condition of re-admission. Students who do not complete the probationary semester with a cumulative GPA above the suspension level will return to Academic Suspension Status.

TIMELY ADVISING REQUIREMENT

All students on Academic Warning Status or Academic Probation Status are required to meet with their academic advisers during the first four weeks of classes in regular semesters to review their academic situations and to formulate or review and revise as needed their plans of study. Any student in either of these statuses who does not comply with these requirements to consult with the faculty adviser will not be allowed to register for and continue enrollment at the University during subsequent fall and spring semesters unless the cumulative GPA is 2.000 or greater at the end of the semester in which the requirement was not met.

READMISSION OF FORMER AND SUSPENDED DEGREE STUDENTS

An undergraduate degree student who fails to enroll or attend at all, during any regular semester, is considered a "former degree student and must re-apply for admission to continue. Readmission applications should be submitted as soon as possible but no later than 30 days prior to the date of desired enrollment. Former students returning should be aware that enrollment restrictions may be imposed at any time which may affect their readmission. A student who received a bachelor's degree must: apply for admission to the Graduate School, register as a Post-Baccalaureate Studies Student through Lifelong Education; or apply for readmission as a candidate for a second bachelor's degree or professional degree or as an undergraduate Unclassified Student.

A non-refundable $25 fee is required for all applications.

READMISSION FOR STUDENTS ELIGIBLE TO CONTINUE

Students who were eligible to continue at NC State at the time of leaving are eligible to be readmitted to their former program provided they have a grade point average of 2.000 on all courses taken at NC State and provided there is space available.

A student who was eligible to continue at the time of leaving who has subsequently taken work at another institution and earned less than a C- average on such work must complete a readmission form and write a letter of petition to the University Admissions Committee.

A student who was eligible to continue at the time of leaving and whose grade point average is less than 2.000 will be:

- Considered for readmission on Academic Warning status if the student's GPA is not lower than the level required to be eligible to continue under the current policy;
- Considered for readmission on Academic Probation Status for one semester if the student's GPA is below the level required to be eligible to continue under the current policy. Considered for readmission on Academic Probation Status, if the student's grade point average on all courses taken at NC State is such that the student was or would have been suspended.

A former student returning who desires a change of curriculum must have their records transferred to the new school/college and submit a properly validated Curriculum Change Form to the Department of Registration and Records, 1000 Harris Hall, before readmission can be processed.

READMISSION FOR SUSPENDED STUDENTS

Automatic Readmission

A student who is academically suspended may do one or all of the following:

- enroll in NC State courses during any number of summer sessions at NC State,
- enroll in NC State courses through independent studies, and/or
- enroll in NC courses via Cable or courses via videocassette.

For further information regarding Cable or videocassette class, contact the Office of Telecommunications, 218 McKimmon Center, 515-7730.

Courses taken at an institution other than NC State or offered by some other institution through Independent Studies do not affect a student's suspension status at NC State.

When by one or all of these methods a suspended student has improved his or her academic standing to the extent that the student is no longer academically suspended, that student becomes automatically eligible for readmission to a regular semester and no letter of appeal to the University Admissions Committee by the student is necessary.

Appeal To University Admissions Committee

A student who is academically suspended, who is ineligible for automatic readmission as described above, may appeal to the University Admissions Committee for readmission. Such students should be encouraged to do so if they feel that circumstances which led to the academic difficulty have changed or can now be accommodated successfully. If granted readmission, the student will be eligible to enroll for one semester on Academic Probation Status. A letter must be written to the Committee stating: the reasons for former academic difficulty with an explanation of extenuating circumstances; why the student believes he/she can now successfully meet all degree requirements within a reasonable length of time; the summer sessions, Independent Studies, or NC State off-campus courses that have been completed; the address and telephone number to be used by the Admissions Committee's for notification of a decision. The Admissions Committee will not act on the appeal of any student currently enrolled in any summer sessions, Independent Studies or off-campus courses.

Letters of appeal should be mailed to: Department of Registration and Records, Attention: Admissions Committee, NCSU, Box 7313, Raleigh, North Carolina 27695-7313. The letter must reach the Department of Registration and Records by the following deadlines:

- no later than two weeks before the first day of classes in the fall semester for students who did not attend summer school or who attended first summer session only;
- no later than one week before the first day of classes in the fall semester for students who attended second summer session; and
- no later than one week before the first day of classes in the spring semester.

The Admissions Committee meets prior to the first day of classes. All material must be received in accordance with the above dates.

Appeal To University Admissions Committee By Students Who Have Not Been Enrolled At Nc State For Three Or More Years (Contractual Readmission)

After not being enrolled at NC State (excluding summer sessions, Independent Studies, and NC State off-campus courses) for a continuous three-year period or longer, a student whose former academic record at NC State was such that the student was suspended or would have been suspended under current policies, may petition the University Admissions Committee for contractual readmission.

The Committee will decide each case on its individual merits with special regard to the student's written appeal, the productive use of the three or more intervening years, evidence of motivation and achievement based on any academic work done during those three or more years, and a supporting letter from the department offering the curriculum into which the student requests admission. This letter must contain a proposed plan of study agreed to and signed by the student, the department head, and the dean. If the curriculum into which the student requests admission is different from that in which the student was last enrolled, the petition to the Admissions Committee must also be accompanied by a Curriculum Change Form approved by the accepting dean. If a contractual readmission is approved, the following conditions apply:

1. the student's entire academic record at NC State will be recorded on any subsequent transcript, including a grade point average on all work attempted at NC State.
2. for courses attempted prior to readmission, only work of C- or better will count toward fulfilling graduation requirements, providing that such courses meet current curriculum requirements.
3. for purposes of suspension and eligibility for graduation, a second grade point average will be calculated based only on courses that are attempted after readmission. Total hours for graduation and suspension will be based on all work at NC State after readmission plus former work of C- or better that is acceptable to the department plus hours transferred from other institutions.
4. the student must maintain an overall grade point average of 2.000 or better on all courses attempted after readmission.
5. students who fail to achieve an overall grade point average of 2.000 will lose their contractual readmission status. Their status for subsequent work as a degree student at NC State shall be determined on the basis of total hours attempted at NC State plus transferred hours and their grade point average calculated using all courses attempted at NC State.
6. a student may be readmitted under this option only once.

Once a student has received notice of readmission, the student should register using telephonic registration. The student's personal ID number will be included in the notice of readmission.

WITHDRAWAL FROM THE UNIVERSITY

Students who wish to drop all the courses for which they are registered must withdraw from the University for the remainder of the semester or summer session in which they are enrolled. Students who have registered and prepaid are considered to be registered and must be officially withdrawn, unless they have notified the University prior to the beginning of the first day of classes that they wish to have their registration canceled.

It is highly recommended, but not required, that students considering withdrawal consult their faculty adviser or departmental coordinator of advising. The withdrawal process is as follows:

Degree candidates and Unclassified students initiate the official withdrawal process with the Counseling Center, Student Health Center, 2815 Cates Avenue, 2nd floor, 515-2423. Parental approval to withdraw may be required for single students who are under eighteen. Lifelong Education students contact the Office of Adult Credit Programs & Summer Sessions, Registration Desk, McKimmon Center, 515-2265. NC State students carrying course work at another campus under the interinstitutional arrangement must contact the Department of Registration and Records, 1008 Harris Hall, 515-2577, to initiate the paperwork necessary for removal from the class roll at the other institution. Students visiting from other institutions who are registered for NC State course work under the Interinstitutional arrangement must initiate withdrawal on their home campus and contact the NC State Department of Registration and Records.

REPEATING COURSES

COURSE REPEAT POLICY

- Students who repeat a course, regardless if the grade previously was made, will have both grades counted in their cumulative grade point average.
- Undergraduate students may be allowed as many semester hours as are appropriate in the departmental curriculum for courses that are titled seminar, special problems, special topics, independent study or research (and are usually numbered 490-499 or 590-599 and cover topics different from those studied when the courses were taken previously. Unless a course satisfies one or the other of the above conditions, the semester hours will be counted only once toward the number of hours required for graduation even though students repeat and pass the course both times.
- The adviser's approval is required for students to repeat any course previously passed with a C-; no approval can be given for a grade of A or B. Nor will it be given when: students wish to repeat a lower division course that they have passed with a grade of C- or better after having successfully completed an advanced course dealing with the same subject matter; students wish to repeat a lower level course that they have passed with a C- or better which is a prerequisite for an advanced course that they had already successfully completed; students wish to take an introductory course after they have successfully completed an advanced course dealing with similar material.
- Students must not register again for any courses in which they have IN grades; such registration does not remove IN grades; and the completion of the course on the second occasion will automatically result in an F for the uncompleted course.

FIRST YEAR COURSE REPEAT POLICY

For courses first attempted in Fall 1995 and afterwards.

The first year course repeat policy is one of forgiveness that helps new NC State undergraduate students maintain good academic standing. The policy is necessary because new students lack familiarity with the University, and as a result, are more likely to make errors in their choice of courses and total course load.

EFFECTS

- The eligible student who repeats a course while electing that the first year course repeat policy apply, will have the grade points and the credit hours attempted and earned on the first completion of the course removed from the calculation of the cumulative grade point average and from the calculation of the total hours attempted regardless of the grade earned on the second attempt. The modification of the cumulative grade point average which will result from the removal of the grade points and credit hours attempted and earned on the first completion of the course will be calculated and recorded on the student's record after the second completion of the course.
- The course title and grade for the first completion will be shown on the official record with a code (R) to indicate that it was repeated and that the first grade was removed from the computation of the cumulative grade point average.
- The recorded grade point average of the student for the semester in which the course was originally taken will not be changed.
- Repeating a course and exercising the first year course repeat policy does not retroactively change the status of the student as to semester academic hours, academic warning, probation, or suspension in prior semesters.
- Many graduate and professional schools recompute grade point averages in the process of considering an applicant for admission to such programs. This recomputation of grade point averages may include restoring the cumulative grade point average effects of initial attempts at courses repeated under this policy.

ELIGIBILITY

1. the initial attempt and the repeat under this policy must be an NC State course;
2. the course being repeated was completed for the first time after the Summer Session II 1995;
3. the course being repeated must be at the 100- or 200-level.
4. the student received a grade below C- in the course that is to be repeated;
5. both attempts of the course were for letter grades; no unsuccessful audits or credit-only attempts may be repeated nor may repeats under the policy be made for audit or credit-only;
6. the student has not received credit for an advanced course dealing with the same subject matter as the course being repeated;
7. the *first* attempt of the course must have occurred within 12 months of the student's initial enrollment in any classification at NC State; this period is not lengthened by voluntary or involuntary failure to enroll in subsequent semesters of summer sessions, nor by enrolling at less than a minimum full- time load following the initial date of enrollment;
8. the *second* attempt is for the same course or for an approved substitute course.

9. the *second* attempt occurs in a regular semester or summer session which ends within 12 months of the completion of the first attempt of the course; if the course is not available during that period or if the student is not enrolled when it is available, then the second attempt must occur in the next regular semester during which the student is enrolled at NC State and the course is available;
10. the total number of courses repeated by the student under this policy will not exceed two (2) courses nor will the total of the hours of such courses exceed eight (8) hours, nor will the total number of courses repeated under this policy combined with those repeated under the Course Repeat Without Penalty Policy (see 1995 Undergraduate Catalog) exceed three (3) courses, nor will the total hours of such courses exceed twelve (12) hours;
11. the Notice of Exercise of First Year Course Repeat Policy is filed by the student with the Department of Registration and Records on or before the "last day to drop a course without a grade for courses at the 400 level and below" of the semester or summer session in which the course is repeated.

PROCEDURES

1. students are advised to consult with their academic advisers in making the decision to elect a course repeat under this policy.
2. the student must submit a Notice of Exercise of First Year Course Repeat Policy to the Department of Registration and Records on or before the last day to drop a course without a grade at the 400 level or below of the semester or summer session in which the course is repeated. Forms may be obtained from faculty advisers, departmental coordinators of advising, associate deans for academic programs, and the Department of Registration and Records.

CODE OF STUDENT CONDUCT

All students who enroll at NC State are required to adhere to the Code of Student Conduct. This code... "sets out the kind of behavior that disrupts and inhibits the normal functioning of the University, and what action it will take to protect the community from such disruption." Academic and Non-Academic Misconduct, both on and off campus are addressed in the Code. Students charged and found guilty of violating the Code of Student Conduct will receive sanctions that may range from an oral reprimand to expulsion from the University. For more information contact the Office of Student Conduct at 515-2963 or access the Code at the following World Wide Web site:
http://www2.ncsu.edu/ncsu/stud_affairs/policies/

NC STATE STUDENT SERVICES

ACCIDENT AND HEALTH INSURANCE

The University offers students an accident and health insurance program. The insurance covers the surgical, accident, and hospital needs of participating students as a supplement to Student Health Services. Each year complete information is available to students at the start of the fall semester. Students are strongly encouraged to have medical insurance protection of some type.

THE UNIVERSITY CAREER CENTER

The University Career Center's goal is two-fold: to assist students in developing their career objectives and to provide a link for students to the employment world. It offers assistance to all students at the University on a year round basis.

To assist in career development the Center provides individual counseling and small group career decision-making seminars. Center staff promote, arrange, and coordinate job interviews between students and employer representatives, schedule visits of recruiters to campus, refer student resumes to requesting employers, and maintain job vacancy announcements. In addition, career advisors recommend contacts with employers, and maintain job vacancy announcements. In addition, career advisors recommend contacts with employers not visiting campus, conduct information sessions on the job search process, and maintain the Center's home page. The Center maintains an extensive library of career and job information. In addition, the Center helps students find internships, summer, and part-time jobs related to their career objectives.

CHAPLAINS' COOPERATIVE MINISTRY

The Chaplains' Cooperative Ministry at NC State is an interfaith organization which both supports individual campus ministries and plans jointly sponsored interfaith programs for students, faculty, and staff. Its members, both ordained and non-ordained, strive to be leaders within the University as inquiry, dialogue, and development trust are engaged with trust at all levels.

The office has a prominent location off the first floor lobby of the Talley Student Center and the membership is through the Department of Student Development. Ministries within member groups support the spiritual and emotional growth of students through scriptural studies, worship, meals, socials, various outings, retreats, mission trips, counseling, service projects, and opportunities for leadership. Following is a list of current phone numbers and addresses:

Chaplains' Cooperative Ministry
1201 Talley Student Center, Box 7306, NCSU, 27695
515-2414

Department of Student Development (University Liaison)
2009 Harris Hall, Box 7314, NCSU, 27695
515-2441

Baptist
2702 Hillsborough St., 27607

Campus Christian Fellowship
P.O. Box 5182, 27650
859-6800

Campus Crusade for Christ
1912 Myron Dr., 27607
782-3393

Catholic
Doggett Center,
600 Bilyeu St., 27606
833-9668

Cloud and Fire Express (coffeehouse)
2512 Hillsborough St., Raleigh, 27607
834-5229

Disciples of Christ
718 Hillsborough St., 27603
832-7112

Episcopal
Sarah F. Cheshire House, 2208 Hope St., 27607
834-2428

Grace Community Church
201 Coorsdale Dr., Cary, 27511
467-7670

Hillel
8210 Creedmoor Rd. #104, Raleigh, 27613
676-2200

InterVarsity
1117-2A Crab Orchard Dr., 27606
854-1160

Lutheran
2723 Clark Ave., 27607
828-1433

Methodist
2503 Clark Ave., 27607
833-1861

Metropolitan Community Church
St. John's, 805 Glenwood Ave., Box 5626, 27650
834-2611

Presbyterian
27 Horne St.,Box 5635, 27650
834-5184

REACH Campus Ministries
700 Brooks Ave., 27607
821-2400

Unitarian Universalist
3313 Wade Ave., 27607
781-7635

COUNSELING

The Counseling Center assists individuals in gaining a better understanding of themselves. Psychologists, professional counselors, and psychiatrists are available to work with students who desire assistance with concerns such as choosing a career, academic planning, identifying and overcoming educational difficulties, developing greater self-understanding, developing more satisfying personal relations, and coping with stress or emotional crisis. All counseling is strictly confidential.

In addition to individual counseling, workshops and support groups are offered throughout the year in a variety of areas, including vocational exploration and stress reduction.

The Counseling Center is located in Student Health Center, 2815 Cates Avenue, 2nd floor. Appointments may be scheduled by calling (919) 515-2423 or stopping by our office.

FOOD SERVICE

University Dining, the University's food service department, has 13 campus locations to serve students, faculty, and staff. Awarded the Ivy Award by *Restaurant & Institutions* magazine in 1988, University Dining is recognized nationally for exciting and innovative concepts in campus dining.

The Fountain Dining Hall, located on West Campus serves as the main hub for the meal-plan program. The Dining Hall offers its patrons an all-you-can-eat menu in a modern, comfortable atmosphere that breaks from the traditional cafeteria-

style service. The Dining Hall is open seven days a week, with brunch and dinner served on weekends. A registered dietician is on staff to assist with dietary restrictions and to provide nutritional or diet counseling.

Meal Plans. *Freshmen who live in the residence halls are required to participate in one of many University Dining meal plans,* each tailored to meet different needs. All seven meal plans are designed with both structure and flexibility. The structured element of the program is a set number of meals served in an all-you-can-eat fashion in the main Dining Hall. The flexible element is a Cash-Points system. Part of the meal plan purchase price is directly converted to a non-refundable Cash-Points account that can be used only at University Dining locations on campus. Cash-Points are a dollar-for-dollar equivalence built into each meal plan to allow students the flexibility of eating meals away from the Dining Hall. The meal program is designed to allow students to chose the number of structured meals and the amount of flexible Cash-Points.

University Dining takes pride in offering quality food and services designed specifically to meet the wants and needs of students. These seven meal plans provide students with varied menu choices and the utmost in convenience. *For more information on meal plans contact the AllCampus Office, West Dunn Building, (919) 515-3090.*

DISABILITY SERVICES

Students requiring special assistance because of visual, hearing, or motor disabilities should contact Disability Services for Students (DSS), NC State, Box 7312, Student Health Center, 2815 Cates Avenue, 1st floor, Raleigh, NC 27695-7312, (919) 515-7653 (Voice/TDD). Interpreter, tutorial, note taker and/or reader services are available by contacting the center.

Direct services for all learning disabled students, such as educational counseling and arrangements for appropriate academic support, can also be initiated by DSS.

Those students needing special assistance in scheduling courses should make contact as far as possible in advance of preregistration deadlines.

HEALTH

The University seeks to safeguard the health of the students in every way possible. Student Health Services, located in the Student Health Center, offers medical care to students on an outpatient basis. The facility is staffed by fulltime physicians, registered nurses and other medical support personnel.

The Health Service is open for outpatient medical care from 8 a.m. to 10 p.m., Monday - Friday and 8 a.m. to noon on weekends during fall and spring semesters (excluding breaks). Physicians maintain regular office hours Monday - Friday and are on call at other times. A nurse staffed clinic is operated during evenings and weekends. Patients are seen by appointment (515-7107); Gynecology (515-7762). Summer session hours are Monday - Friday, 8 a.m. to 5 p.m.

All registered students pay a medical fee which covers outpatient professional services; i.e., visits to a nurse or physician, routine laboratory procedures and some medications available in the student pharmacy. There is a nominal charge for x-rays, some lab tests, allergy injections, prescription medications and special clinics. Students are responsible for the cost of laboratory tests and x-rays which must be performed by an off-campus agency, medications not available in the student pharmacy, and expenses incurred when referred to an off-campus physician or hospital.

All health and medical information is confidential and is not divulged to anyone without the written consent of the patient.

Health Educators offer a variety of information, programs, and services to students. Health topics include weight control, alcohol and drug education, stress management, sexually transmitted diseases, women's issues, and more. Call 515-WELL (9355) for information.

LAUNDRY AND DRY CLEANING

The University is currently providing a laundry and dry cleaning facility on campus at reasonable prices.

BOOKSTORES

The official campus source for all course-books is the NCSU Bookstore, consisting of the main store, located on East Dunn Avenue, the North Campus Shop, located in the lower level of Erdahl Cloyd Annex of the D. H. Hill Library, and the Century Shop located in Research III, Centennial Campus. At the main store, the book division provides textbooks, fiction, nonfiction, technical and reference titles, publishers' overstock and remainders, college outlines, paperbacks, book reviews, periodicals, and calendars. The merchandise division carries school supplies, personal computers with accessories and supplies, art and engineering supplies, greeting cards, health and beauty aids, imprinted sportswear, souvenirs, and convenience items. Special orders are accepted for books and merchandise. Purchases may be charged by VISA, MasterCard, Discover, or AllCampus Money Card. During the opening of fall and spring semesters, the main store is open specified evenings, in addition to each Tuesday evening and Saturday when classes are in session. North Campus Shop specializes in

computer supplies, sale books, magazines, college outlines, greeting cards, souvenirs, gifts, and convenience items. The entire operation of the Bookstore is completely self-supporting, with its annual surplus transferred to NC State Scholarship Fund.

TRANSPORTATION

All vehicles parking on campus during the hours of 7:30 a.m. - 5:00 p.m., Monday through Friday, must display an appropriate NC State permit. Freshmen residents and off-campus students living within a one mile radius of campus are not eligible for campus parking permits. Permits are distributed through a year-round registration process. As permits become available throughout the year, they are assigned according to a "wait list." Transportation alternatives include the University's Wolfline bus service, motorcycles, mopeds, bicycles, and car pools.

Wolfline operates when classes are in session, Monday through Friday. All Wolfline buses travel along designated routes and stop at signed Wolfline bus stops. A valid student AllCampus Card is all that is required to ride the bus. Route and schedule brochures are available at D. H. Hill Library, the Student Center, NC State Bookstores, and at Transportation. The citywide bus service, Capital Area Transit (CAT) and the regional system (TTA), are available for students living throughout Raleigh.

Bicycling offers an inexpensive alternative. Bicycle registration is encouraged to assist in recovery if the bicycle is lost or stolen. Bicycles may be registered with Transportation, Public Safety, or the residence halls at no charge.

For more information, contact Transportation, NC State, Box 7221, Raleigh, NC 27695-7221, (919) 515-3424 or visit our Transportation website at http://www2.acs.ncsu.edu/trans

NC STATE STUDENT ACTIVITIES

The University makes every effort to provide surroundings which are pleasant and conducive to intellectual growth. In addition, a wide variety of athletic, cultural and social opportunities are available to students. Through the services and activities affiliated with campus life, as well as through extracurricular organizations and functions, students at NC State may acquire experience in group leadership and community living to supplement and enrich their education.

STUDENT GOVERNMENT

Every NC State student is a member of a community which exercises executive, legislative and judicial authority in matters of student life. Students have a voice in government through participation in campus-wide elections of officers, legislators, and judiciary members.

CLUBS AND SOCIETIES

Honorary. University-wide honorary societies include Golden Chain, senior leadership; Thirty and Three, junior leadership; Phi Eta Sigma and Alpha Lambda Delta, freshman scholarship; Gamma Beta Phi, scholarship and service; and Phi Beta Kappa and Phi Kappa Phi, junior, senior and graduate student scholarship.

Professional and Technical Organizations. The colleges and departments sponsor or supervise a large number of professional and technical societies and clubs. These organizations contribute substantially to the students' professional and social growth.

Greek Life (Fraternities and Sororities). Fraternities and sororities are included in the many educational programs at NC State. Fraternal groups provide opportunities for students to develop skills of social interaction, community service, teamwork; sensitivity to the rights and needs of others, and leadership and management experience. Many fraternities and sororities offer housing opportunities as an additional benefit of membership.

Twenty-five general college fraternities have chapters at NC State. They are Alpha Gamma Rho, Chi Psi, Delta Chi, Delta Sigma Phi, FarmHouse, Kappa Alpha, Kappa Alpha Psi, Kappa Sigma, Omega Psi Phi, Phi Beta Sigma, Phil Delta Theta/FIJI, Phi Kappa Tau, Pi Kappa Alpha, Pi Kappa Phi, Pi Lambda Phi, Sigma Alpha Epsilon, Sigma Alpha Mu, Sigma Chi, Sigma Nu, Sigma Phi Epsilon, Sigma Pi, Tau Kappa Epsilon, Theta Chi, and Theta Tau.

NC State has nine inter/national general college sororities. They are Alpha Delta Pi, Alpha Kappa Alpha, Alpha Phi, Chi Omega, Delta Sigma Theta, Delta Zeta, Sigma Kappa, Zeta Phi Beta, and Zeta Tau Alpha.

If you are interested in membership, educational programing, and /or service opportunities, please consult the Greek Life Web pages (www/ncsu/greeklife), or visit the office (2011 Harris Hall), or call (919)515-2441.

Pershing Rifles. This is a professional and social fraternity open to students enrolled in any ROTC courses. Members of the Pershing Rifles participate in ceremonies such as the Color Guard for NC State athletic events and Pennant Guard for home football games. Pledge period is one semester, and focuses on the history and traditions of the Pershing Rifles, as well as technical ability in the mastery of drill and ceremonies.

The Ranger Challenge Team. Open to all members of the Wolfpack Battalion. Members participate in intercollegiate competitions of military skills, including rifle marksmanship, hand grenades, ruck marching, patrolling, weapons assembly, the APFT, and rope bridge construction. NC State's Ranger Challenge Team is consistently one of the best on the east coast. Sponsored by Army ROTC, it competes against other schools in North and South Carolina, as well as schools on the east coast.

Other Organizations. There are over 250 other student organizations. Students interested in exploring these organizations or in creating a new organization, may contact the Student Organizations Resources Center, Box 7306, Room 3101 Talley Student Center, (919)515-3323.

STUDENT MEDIA

NC State students have the opportunity to edit and manage a variety of student-oriented media. By working with these media, students may gain valuable extracurricular experience in journalism, broadcasting, production and design, leadership and management. There are five media staffed by students and supported in large part by a designated portion of each student's non-academic fees.

The **Agromeck,** the University yearbook, is published in the fall of each year and provides a record in words and pictures of student and campus activities during the past year.

The **Nubian Message**, published once a week, provides news and features about the African American community.

The **Technician**, the University's oldest student newspaper, is published Monday through Thursday.

The **Windhover**, the campus literary and visual arts magazine, is published each spring.

WKNC (88.1 FM), the student radio station, operates at 3000 watts, enabling it to be heard within a 42-mile radius of Raleigh. The station operates 24 hours a day with a full staff of engineers, disc jockeys, and news personnel.

Several of the colleges have their own publications dealing with material of special interest to students in these areas. The publications include Agriculture and Life Sciences' *Agri-Life*, Forest Resources'

MUSICAL ORGANIZATIONS

Since the early days of NC State, musical organizations have played an important part in campus life, presenting concerts, furnishing music for official University functions and performing at athletic events. Indeed, participation in musical organizations has provided many opportunities for students to develop artistically as well as intellectually, and to balance the rigors of other academic study with educational experiences that provide pleasure and satisfaction.

The majority of organizations receive one academic credit which may be used to satisfy University free elective requirements in any academic major. Membership in all musical organizations requires an audition with the insturctor.

UNIVERSITY STUDENT UNION

The **University Student Union's** Visual and Performing Arts and Activities Programs is the umbrella, organizational structure for most of the major arts and activities programs presented at North Carolina State University. **The Union** seeks to create "A Perfect Union of Arts and Activities" for all members of the University family - students, faculty, staff, administration, alumni, and guests. **The University Student Union** consists of eight arts and activities programs presenting more than 900 events per year: **Cinematic Arts Program** provides an international film series, a series of independent and experimental film makers, and a popular commercial film series), **Center Stage at Stewart Theater** (presents a wide variety of touring professional performing arts events), **The Crafts Center** (offers hands-on course work in a variety of crafts including pottery, fiber arts, photography, flat glass and woodworking), **Dance Program** (provides credit and non-credit opportunities in dance, with two student dance companies and classes in technique, choreography and performance), **Music Department** (offers 11 choral and instrumental performance ensembles, available to students for credit and non-credit participation, course work in music theory, history, composition and performances, and an 18-hour music minor), **Student Center Activities Office** (consisting of the Union Activities Board's eight student committees, the Student Leadership Center, and the Cinematic Arts Program), **Thompson Theater** (is a student-producing theater, staging up to 13 productions annually, offering credit and non-credit participation in acting, direction, stage management and theater design, and an 18-hour theater minor), **Visual Arts Center** (hosts exhibitions annually, and manages the University's permanent collections of

textiles, ceramics, paintings, sculpture, furniture, photography and architectural, visual, graphic and products designs), and four support offices **(Administrative Office, Business and Computer Planning, Reservations Office and Facilities Maintenance)**. The University Student Union's programming is carried out in four facilities: University Student Center, Witherspoon Student Center, Price Music Center, and Thompson Building.

CENTER STAGE AT STEWART THEATER

Center Stage presents more than 20 professional performing arts events annually in Stewart Theater. Performances include jazz, dance, drama, comedy, experimental theater, world music and traditional music. Stewart Theater is also the home to many other campus-sponsored events. Special rates are available to NC State students, faculty, and staff.

Cinematic Arts Program

The Cinematic Arts Program is a 500-seat Campus Cinema located on the first floor of Witherspoon Student Center. The Passport International Film Series and the Southern Circuit Film and Lecture Series, which features showings of work and discussion by contemporary cinema photographers, are presented annually in the Campus Cinema. The UAB Films and UAB Lectures Committees select films and speakers for these and other series. For more information, call 515-5161.

The Crafts Center

Located on the ground floor of the Thompson Building is one of the finest crafts facilities on any university campus. In 1996, The Crafts Center was awarded the Raleigh Medal of Arts for extraordinary achievement in the arts. Instruction is offered in pottery, woodworking, photography, weaving, flat glass, lapidary, telescope making, art, and much more. Studios are also available for independent work. The Crafts Center is open year-round and showcases between three and five exhibitions in a gallery dedicated to fine craft. A class in General Ceramics (TED 351) is offered for credit through the Department of Technology Education.

Dance Program

The Dance Program sponsors two student dance companies, NC State Dance Company and DanceVisions. Both companies are open by audition and offer performances on and off campus each semester. In cooperation with the Department of Physical Education, the Dance Program offers classes in dance technique, choreography and performance, plus master classes, lecture-demonstrations and performances by guest artists.

MUSIC DEPARTMENT

Music performance organizations have been an important part of campus life for much of University's history. Students in these groups perform in concerts and recitals on and off campus, participate in athletic events, and furnish music for official University functions. Each of the following ensembles is offered for academic credit. An audition with the instructor is required. For more information, please contact the Music Department office: telephone: (919) 515-2981; fax (919) 515-4204; e-mail: robert_petters@ncsu.edu. (Director of Music).

Chamber Music. Students may elect to perform in a small ensemble of traditional or non-traditional instrumentation. Students with similar abilities will be placed in an ensemble by a faculty member or coach if an appropriate instrument grouping and rehearsal schedule can be established.

Choral Ensembles. Students may select from five diverse ensembles currently offered for credit: Women's Choir, Varsity Men's Glee Club, Chamber Singers, New Horizons Gospel Choir, and the Raleigh Oratorio Society Symphonic Choir. The Choral Department offers students from all academic areas an opportunity to participate in the exploration and performance of the highest quality of choral repertoire spanning five centuries. Performance highlights have included concert tours of the Eastern United States and France, performances with the North Carolina Symphony, appearances at the North Carolina Music Educators Conference, as well as fall and spring concerts in Stewart Theater on the NC State campus.

NC State Pipes and Drums. Students may play the bagpipes, an instrument known to many of North Carolina's earliest settlers, in order to represent the university through this unique and distinctive medium. Pipes, drums, and other equipment are furnished. Beginning pipe and drum lessons are available to students without previous experience

Orchestras. Members of the Raleigh Civic Symphony and other orchestral ensembles include NC State students, faculty, and staff, students and faculty from area colleges and universities, and community members. Placement is made according to individual ability, interest, and experience. A wide range of orchestra music is read and performed, with concerts given on and off campus.

Winds and Percussion Ensembles. The Marching Band, Wind Ensemble, Symphonic Band, Concert Band, British Brass Band, Jazz Ensemble, Percussion Ensembles, Clarinet Choir, and Pep Bands comprise the Winds and Percussion program. The Marching Band is active during football season; the Pep Bands during basketball season. Other bands and ensembles

usually meet both semesters. Placement in a band or ensemble is made according to student ability and interest. All Pep Bands members also must be enrolled in one of the above bands or ensembles during the semester they play with the Pep Band.

STUDENT CENTER ACTIVITIES OFFICE

The Student Center Activities Office sponsors the Union Activities Board, the Student Leadership Center, and the Cinematic Arts Program (see Cinematic Arts Program listing).

The **Union Activities Board** (UAB) is a student-directed programming network of eight committees which plan and implement a variety of programs for the campus community, including the Black Students Board, College Bowl, Entertainment Committee, Films Committee, Leisure & Recreation Committee, International Activities Committee, Leadership Development Committee, and Lectures Committee.

The **Student Leadership Center**, sponsored by the University Student Center Activities Office, offers a variety of programs such as the Leadership Development Series and the role Model Leader's Forum that are designed to give all NC State students the opportunity to explore the nature of leadership and to develop their leadership potential and skills in living. The Leadership Development Series consists of approximately 25 non-credit workshops that focus on different aspects of leadership. The workshops are offered Monday through Thursday evenings. Further information may be obtained from 3114 University Student Center, (919) 515-2452.

The **NC State Team Challenge** (Ropes Course) is a series of initiatives offering lessons in communication, leadership, ethics, conflict resolution, diversity, teamwork, and trust.

The **Leadership Certificate Program**. You design! Complete dive Core Competency Workshops plus five electives of your choice and receive a Leadership Certificate from your College or School (awarded to currently enrolled NC State students only).

Descriptive Leadership Transcript. Dynamic resume supplement informs employers of your commitment to developing personal leadership skills. Describes workshops you've completed as well as other accomplishments at NC State.

Role Model Leaders' Forum. Listen to national and international leaders speak their mind on the topic of leadership, follow-up with a question and answer session and a reception. Call 515-2452 for more information.

Leadership Library contains over 250 leadership reference materials available for checkout (books, audio cassettes, videotapes, newsletters). A complete listing is available on-line. Open 8:00 am to 5:00 pm, Monday through Friday. Available to NC State students, faculty and staff. FREE!!

THOMPSON THEATER

Thompson Theater is North Carolina State University's volunteer student theater, housed within the Division of Student Affairs. Under the direction of a full-time professional staff, Thompson Theater continues its tradition of quality productions in the performing arts.

Four major shows are produced each season, a children's theater production that also tours North Carolina schools in the spring, two student-directed studio productions, the annual Madrigal Dinner and TheatreFest, a summer season that features local professional and student artists.

Thompson Theater offers a blend of student volunteer productions and academic theater training. Productions are open to all NC State students, whether or not they are enrolled in theater courses, thus providing an extra-curricular production program. Classes are available in acting, directing, introduction to theater, and all areas of technical theater, including stage craft, costume, make-up, lighting, and scenic design. Communication majors can receive a Theater Minor.

Theater student organizations, open to all NC State students, include University Players, Alpha Psi Omega and Black Repertory Theater.

VISUAL ARTS CENTER

The arts are an essential component of a complete university education, and the Visual Arts Center provides North Carolina State University students direct and unique access to the visual arts. Since 1979 The Visual Arts Center has been responsible for the development and conservation of North Carolina State University's collection of photography, paintings, ceramics, textiles, furniture and architectural drawings by regional and national artists.

The Visual Arts Center's two galleries are located on the second floor of the Student Center at 3302 Cates Avenue and offer a series of exhibitions, free and open to the public, featuring the best examples of regional, national and international art. The Visual Arts Center also offers internships, educational programs and tours for North Carolina State University students.

The Administrative offices of the Visual Arts Center are located on the third floor of the Student Center and the phone number is 919/515-3503.

FACILITIES

University Student Center is the location for a variety of facilities, programs, and services designed to offer rest, relaxation and recreation, as well as cultural, social, leadership and artistic development. Facilities in the University Student Center building include several lounge areas; 18 meeting and activity rooms, available by reservation to all campus organizations, with access to catering and audio-visual services; two television lounges; Jeremiah's Game Room; a variety of dining opportunities, including The Underground Pasta and Grill Restaurant, Commons Cafe and Emporium Convenience Store; Center Stage at Stewart Theater and the Visual Arts Center. Program offices include the International Student office, Chaplains' Cooperative Ministry, Student Legal Services, and University Dining administrative and catering offices. Service areas include the Reservations and Facilities Management Offices, Information Center and Ticket Central.

Witherspoon Student Center, located three blocks west of the main building, houses the African-American Cultural Center, Student Government Offices, Sorority/Fraternity Group Buying Network, the Media Authority and offices of five student-run media organizations - *Technician* and *The Nubian Message* (newspapers), *Agromeck* (yearbook), *Windhover* (literary magazine), and WKNC FM 88.1 (radio station). The Witherspoon Student Center Annex also includes several lounge areas, including two balconies; one meeting room available by reservation; the African-American Cultural Center's Multi-Purpose Room, Gallery and Library; and the Campus Cinema, used for films, lectures and special events.

Price Music Center is the location for the Music Department and its programs.

Thompson Building is the location for Thompson Theater and The Crafts Center.

ATHLETICS

The University's "Wolfpack" athletic teams are well known nationally. The men's basketball team won national championships in 1974 and in 1983 and holds 10 Atlantic Coast Conference titles. The football team has been the Atlantic Coast Conference champion five times, co-champion twice, and has played in 16 bowl games. The Wolfpack women's cross-country team won national championships in 1979 and 1980 along with 10 ACC crowns, while the men's and women's soccer teams have both advanced to the NCAA's "final four" in the last six years. The women's basketball team, under the direction of 1988 United States Olympic gold medal winning coach Kay Yow, has played in 11 of 15 ACC Tournament title games. The wrestling team has won nine ACC titles while the men's swim team has claimed 24 conference championships. Providing additional color and spirit for the games, the cheerleading squad was recognized three times as national champions. Numerous individual NC State athletes have won NCAA titles, national championships, and international honors, including medals in the last four Olympic Games in which the United States has competed.

INTERCOLLEGIATE ATHLETICS

The Department of Athletics conducts the University's intercollegiate athletics program involving 11 varsity sports for men, nine for women, and one co-ed.

The athletics program is administered by the Athletics Director with the Athletics Council, made up of 11 faculty, three alumni, two members of student government, two student athletes, and one coach, serving in an advisory capacity to the Athletics Director and Chancellor. The program is self-supporting and is operated through gate receipts, radio and television revenues, and student fees. Funds for athletics grantsinaid are provided through the North Carolina State Student Aid Association (Wolfpack Club). Grantsinaid are based upon the recommendation of the coach of each sport, approved by the Athletics Director, and awarded by the University's Financial Aid Office.

Men's varsity sports include soccer, cross country, and football in the fall; basketball, swimming, indoor track, and wrestling in the winter; and track, golf, tennis, and baseball in the spring. Varsity sports for women are soccer, cross country, and volleyball in the fall; basketball, indoor track, swimming, and gymnastics in the winter; and track and tennis in the spring. During the winter the co-ed rifle team competes.

The University facilities include Carter Finley Stadium (51,500 seats); Reynolds Coliseum (12,400 seats for basketball); Doak Field (3,800 seats for baseball); the Paul H. Derr Track Stadium (3,000 seats) with a nine-lane tartan track; a 2,200 seat swimming stadium with a 25-yard by 25-meter pool and a 50-meter training and competition pool; a soccer field (5,000 seats); and a 12-court all-weather tennis complex. In addition, the Wolfpack athletics administrative offices, women's intercollegiate coaches' offices, several men's sports coaches' offices, and an athletics dining hall are housed in the Case Athletics Center. The Weisiger Brown General Athletics Facility houses the football, track, and wrestling coaches' offices, a weight room, a wrestling room, a training room, an equipment room, and dressing rooms for football, wrestling, and track. Reynolds Coliseum has a weight room, training room, and locker and dressing facilities for the women's sports and dressing

rooms for the men's sports of basketball, baseball, soccer, and tennis. For ticket information, call (919) 515-2106 or 1-800-310-PACK.

INTRAMURAL RECREATIONAL SPORTS

NC State maintains an extensive program of intramural-recreational sports administered by the Department of Physical Education. This program is composed of divisions in intramurals, club sports, informal recreation, fitness, and outdoor adventures. Additional opportunities are available in extramural sports and special events. The program offerings are available to all students, faculty, and staff.

Seventeen sports are scheduled through intramurals including basketball, flag football, softball, soccer, volleyball, badminton, bowling, cross-country, golf, handball, pitch & putt, racquetball, squash, swim meets, table tennis, tennis, and track meets.

There are 30 active clubs with seven seeking affiliation to active status. The active club sports are aikido, angling, archery, baseball, bowling, cricket, cycling, equestrian, frisbee, ice hockey, judo, lacrosse (men), lacrosse (women), outing, racquetball, rodeo, rowing, rugby, sailing, snow skiing, soccer (men), soccer (women), tae kwon do, tennis, triathlon, volleyball, water polo, water skiing, windsurfing, and wrestling. Those seeking affiliation are fencing, field hockey, golf, mountain biking, roller hockey, social ballroom dance, and weight lifting.

Some of the activities included in informal recreation are archery, backgammon, croquet, darts, free throw/hot shot contest, grass volleyball, home run derby, pickleball, putting contest, spades tournament, and wallyball. Fitness activities include a variety of aerobic sessions, aqua aerobics, fit pack, and (WSR) walking, swimming, and running. Additionally, there are fitness workshops in the areas of back care, cross-training, foot care, injury prevention, massage, nutrition, stress management, swimming stroke clinic, weight training, and yoga. Extramural sports provides for participation in "Big Four Sports Day," a competition between Duke, NC State, UNC-Chapel Hill, and Wake Forest. Students also participate in the National Flag Football Championship and Schick Super Hoops.

The outdoor adventures division provides trips for backpacking, birding, camping and hiking, canoeing and kayaking, and wildlife art exposition. Instructional workshops are offered for backpacking and expedition planning, canoeing and fishing, photography, rockclimbing, and wilderness cooking. The outdoor adventures storehouse contains various equipment available for checkout to all students, faculty, and staff.

The Intramural-Recreational Sports Program is comprehensive in scope and committed to meeting the sports and physical activity needs of the students, faculty, and staff at North Carolina State University.

COLLEGES, DEPARTMENTS, AND PROGRAMS OF STUDY

Undergraduate programs of study are offered by the College of Agriculture and Life Sciences, the School of Design, the college of Education and Psychology, the College of Engineering, the College of Forest Resources, the College of Humanities and Social Sciences, the College of Management, the College of Physical and Mathematical Sciences, and the College of Textiles.

GENERAL EDUCATION DISTRIBUTION REQUIREMENTS

The program in General Education establishes the foundation for a lifetime of intellectual discovery, personal development, and community service while preparing students for advanced work in various professional disciplines and fields of knowledge.

Courses meeting the General Education requirements introduce students to the disciplines of intellectual inquiry and promote respect for moral values and aesthetic experience. Students further develop an understanding of the human mind and spirit, a sense of history and the duties of citizenship, the workings of society and the world around us.

General Education in the basic fields of knowledge encourages mastery of fundamentals, versatility of mind, motivation for learning, intellectual discipline, and self-reliance. Development of these skills enables ethical and responsible participation in a democratic society and constitutes the best preparation for dealing creatively and constructively with the issues and opportunities of our time.

MATHEMATICAL SCIENCES

Rationale

A logical approach to problem solving is important for successful functioning in society and should include the abilities to formulate models, be critical consumers of quantitative information, communicate mathematically and solve problems.

The study of mathematical sciences will enable the student to:

1. Improve and refine problem-solving abilities including the ability to use the processes of mathematical modeling to bring abstract reasoning to bear on real-world problems. Students learn to formulate problems from real-world situations, move from problems to mathematical models such as graphs or equations, and transform a model into a solution.
2. Develop the ability to communicate mathematically. This includes the abilities to:
   a. Follow simple directions given in prose, flow chart form, or depicted pictorially; read and interpret tables, charts and graphs; and follow directions to conduct mathematical activity or investigation, make conclusions, and write a report that discusses the mathematics of the activity and represents the results in acceptable mathematical notation.
   b. Be able to reduce, tabulate, summarize, analyze, graphically represent, make predictions and draw inferences from presented data arising from real world situations.
3. Demonstrate logical reasoning skills including the ability to distinguish among inductive, deductive, and probabilistic reasoning and to follow, evaluate and construct simple, logical arguments.
4. Build on previously-learned algebraic and geometric concepts and models.
5. Further develop an understanding of the concept and role of functions. This includes the abilities to match functional relationships in real world contexts to mathematical representations; interpret mathematical representations of functional relationships arising in some context back to the original real world situations; and be able to translate among graphical, tabular, and symbolic representations of functions.

NATURAL SCIENCES

Rationale

The natural sciences pursue basic questions about the workings of the universe, and the richness, variety and interconnectedness of the world around us. Students today are exposed to an increasing volume of information, from a large variety of sources, in diverse and changing formats. Training in the natural sciences is essential to help students develop skills to distinguish between testable and untestable ideas, recognize scientifically valid tests of theories, and understand how information relates to those tests. By studying the natural sciences, students learn to reason both inductively and deductively, develop and test scientific hypotheses, and understand the value and limitations of scientific studies. The development and application of new technologies require scientifically-literate citizens who can understand technological issues and evaluate the role of science in society's debate of those issues.

Education in the natural sciences will enable the student to:

1. use the methods and processes of science in testing hypotheses, solving problems and making decisions,
2. articulate and make inferences from the major concepts, principles, laws, theories, and responsible applications of science in specific disciplines;
3. recognize the role of science in the interactions of science, technology and society; and
4. cultivate a life-long interest in science.

Minimum Requirements for all curricula (20 hours)

A total of six courses (20 hours) in the mathematical and natural sciences.

1) Two courses (6 hours) selected from mathematics, statistics, and logic; one must be a mathematics course.
2) Three courses (11 hours) from the natural sciences; two from different basic sciences (biology, chemistry, earth sciences and physics); two of the three courses must have a laboratory.
3) The sixth course (3 hours) selected from any of the mathematical science; natural science; or science, technology and society courses.

WRITING AND SPEAKING

Rationale

Writing and speaking are powerful ways of understanding ourselves and the world we live in. It is though writing and speaking that the various disciplines and professions define the knowledge and methodologies that characterize them. Because these communication arts are central to learning and to engaging in the productive life of a community, students must:

1. learn to use writing and speaking as ways of generation, critiquing, and refining ideas, both their own and those of others;
2. understand and use the conventions and standards governing written and spoken disclosure across academic disciplines;
3. develop the critical reading, writing, and speaking abilities necessary for participating effectively in a discipline;
4. develop a repertoire of strategies for addressing the concerns of audiences in the many contexts of contemporary life--academic, professional, and civic.

Minimum requirement for all curricula (9 hours)

1) Two semesters of composition and rhetoric during the freshman year.
2) One semester from any of the following:
   a) advanced writing,
   b) speech,
   c) foreign language (FL_201 or higher in the student's first foreign language or any FL_course in a second language).

Meeting these goals requires students to engage in writing and speaking across the curriculum. To this end, communications requirements should be integral to all courses used be students to fulfill the humanities and social sciences requirements.

Further, in order that skills develop broadly and consistantly along with the individual's increasing knowledge of subject matter, all upper-division courses offered in the university should incorporate a significant communication requirement, and at least one major written paper should be required in every curriculum in both the junior and senior years.

HUMANITIES AND SOCIAL SCIENCES

Rationale

The humanities and the social sciences comprise the subjects and disciplines that use various modes of rational inquiry to understand human nature and experience, organization and change in human societies, the nature of the world, and rational inquiry itself. An education in the humanities and social sciences requires reading significant works, gaining an exposure to a variety of methodologies, and learning to apply these in written exposition. An education in the basic humanistic disciplines is a necessary part of being truly educated - of becoming a citizen with a broad knowledge of human cultures and with well-considered moral, philosophical, aesthetic, and intellectual convictions.

The goal of general education in the humanities and social sciences is to give the students the foundations for an understanding of:

1. the cultural and linguistic traditions of their own and other societies,
2. the past and the action of historical processes,
3. the application scientific methods to the study of human behavior and mental processes, both individual and collective,
4. ethical choices and the issues of human values they entail, and how to make those choices with intellectual rigor and clarity,
5. the aesthetic, personal, and cultural significance of works of art and,
6. various disciplines as modes of inquiry with distinctive purposes and intellectual processes; and the ability to:
   a. distinguish degrees of plausibility and verification, by critically examining both evidence and logic and,
   b. read analytically (i.e, to reconstruct arguments and consider implications) and interpretatively (i.e, to grasp meaning by being sensitive to the ways in which meaning is generated), as well as to acquire information.

The general education requirements in the Humanities and Social Sciences are designed to expose students to content areas that demonstrate the relevant modes of inquiry:

1. Two courses or the equivalent in the study of history and/or literature (6 hours). The study of history provides an understanding of continuities and changes in human thought and behavior and of the ongoing process in which individuals shape and are shaped by their societies and their governments. Studying history also provides training in the analysis of process and the evaluation of a wide variety of evidence. The study of literature introduces students to the many ways of deriving meaning from the human condition and to the many forms in which meaning is expressed. Studying literature also develops students' capacity for critical analysis and personal expression, their aesthetic sensitivity, and their reading and writing skills.
2. One course or the equivalent in the study of philosophy, religion, or the visual and performing arts (3 hours). In the study of philosophy, students are exposed to the rigorous procedures of philosophical thought, to ethical issues, and to the insights of ethical reasoning. In the study of religions, they are introduced to beliefs of their own and other cultures, and they learn how various religions have resolved ethical issues and have addressed the human condition. The visual and performing arts develop students' aesthetic sensitivities, critical judgment, and personal creativity. They also provide students with an understanding of the cultural and historical dimensions of artistic expression.

3. Two courses or the equivalent from different content areas, in the study of psychology, economics, politics and government, sociology, anthropology and cultural geography. (6 hours). The study of these subjects enables students to understand individual and collective human behavior by exploring meaning within a variety of social, cultural and political contexts; by analyzing the structures within which human goals are established and human choices are made; and by applying theoretical and quantitative models to specific cases.
4. Two additional courses selected within Humanities and Social Sciences (6 hours). These hours could be used to pursue specific interests, to provide additional breadth or develop depth by taking courses focused on a common theme.
5. Among the courses selected to fulfill the Humanities and Social Sciences requirement at least one must focus on a non-English speaking culture.

FOREIGN LANGUAGE

Rationale

In a sense, languages are keys to the world. The continuous expansion of international relations makes the knowledge of foreign languages increasingly significant. In learning a foreign language and studying its literature and cultures, students acquire a body of knowledge about how humans think, view the world, express themselves, and communicate with one another.

Language learning also expands one's ability to create and discover new meaning in one's own language and culture. Knowledge of the linguistic structures of a second language helps students to understand their own language better. Likewise, an awareness of contrasting cultural concepts sensitizes students to the differences between their own culture and others. Such an awareness has become increasingly important as the communities of the world have become more interconnected and interdependent. The needs of our global society require that more citizens have access to other languages and cultures in order to cooperate in the process of improving the quality of human life.

Minimum requirements for all curricula (0 hours)

(1) Two years of high school foreign language be required as a prerequisite for admission to the University.
(2) Foreign language proficiency at the FL_ 102 level be required for graduation.

PHYSICAL EDUCATION

Rationale

Essential to a university student's development are attitudes and skills for healthy life-styles. In addition to maintaining fitness, participation in team and individual physical activity significantly reduces major health risks.

Goals for students in physical education include:
1. learning the fundamentals of cardiovascular and strength development and applying this knowledge in the initiation and/or continuation of personal fitness programs,
2. acquiring the basic skills of several lifetime sports or activities and enhancing their proficiencies in these skills so that they will continue to participate throughout life,
3. gaining a working knowledge of the rules, strategies, and safety aspects of several sports or activities,
4. reducing stress from the academic rigors of their other courses, and improving their general physical, social, and mental well-being while learning, participating, and having fun.

Minimum requirements for all curricula (2 hours)

Two credit hours, one credit each, in physical education
(1) Two courses including one Fitness and Wellness course.
(2) All courses will be available on an S/U basis.

SCIENCE, TECHNOLOGY AND SOCIETY

Rationale

North Carolina State University, as a land grant university, has a mission that stresses the application of science and technology for the betterment of humankind. It is essential, therefore, that students be exposed to the vital interactions among science, technology, society, and the quality of life.

Goals for students in completing the Science, Technology and Society requirement include:
1. developing an understanding of the influence of science and technology on civilizations,
2. developing the ability to respond critically to scientific and technological issues in civic affairs, and
3. understanding the interactions among science, technology and values.

Minimum requirement for all curricula (3 hours)

Courses which satisfy this requirement can be oriented toward science and technology or toward the humanities and social sciences. Students in science and technology should study this topic from a humanities and social sciences perspective. Students with majors in the humanities and social sciences should study this topic from a science and technology perspective. This course can also partially satisfy either the humanities and social sciences requirement or the mathematical and natural sciences requirement (# 3) but not both. This requirement can be satisfied by an interdisciplinary course designed to cover both perspectives.

COMPUTER LITERACY

Today's graduate must have a knowledge of information technology and computer applications. Every student needs a basic understanding of information processing. It is not necessary that every student be a programmer.

Students should develop and demonstrate proficiency in the use of computers, learning to use applications such as word processing, spreadsheets, database management programs, electronic mail, and packages and applications specific to their field of study.

Minimum requirements for all curricula (0 hours)

The following may be used to fulfill computer technology instruction:
(1) instruction and assignments required within courses, and/or
(2) required use of a computer to complete assignments.

LIBRARY/INFORMATION LITERACY

The demands of an increasingly technological and information-dependent society require that students have a basic understanding of how information is identified and defined by experts, structured, physically organized, and accessed.

Proficiency is best gained by requiring the use of information resources to complete an assignment, or to create a bibliography from which a paper or speech is developed. Information retrieval instruction beyond that provided in freshman English could be connected with writing and speaking requirements and/or it could be taught by requiring assignments involving substantial use of library resources. Academic units are encouraged to work closely with library staff for the development and delivery of instruction and experience in information retrieval techniques.

The following may be used to fulfill information retrieval instruction:
(1) use of one or more class periods to teach the structure of information, and to provide experience using major information resources,
(2) use of self-paced printed instructional materials,
(3) use of computer-based instructional materials,
(4) development of an information-based assignment requiring use of library resources, and/or other methods as appropriate for the discipline.

COLLEGE OF AGRICULTURE AND LIFE SCIENCES

115 Patterson Hall
NCSU Box 7642
Raleigh, NC 27695-7642

Phone: *(919)515-2614*
Fax: *(919)515-5266*
E-mail: *cals_programs@ncsu.edu*
Web address: *www.cals.ncsu.edu/*

J. L. Oblinger, *Dean*
G. T. Barthalmus, *Associate Dean and Director, Academic Programs*
J.C. Cornwell, *Assistant Director of Academic Programs and Director of the Agricultural Institute*
B.M. Kirby, *Assistant Director, Academic Programs*
B.P Alston-Mills, *Coordinator, CALS Diversity Programs*
M. L. Bullock, *Coordinator,Career Services*

Academic programs in the college represent a unique blending of the agricultural and life sciences. Agriculture is a very diverse industry that touches everyone's life in some way or another. The life sciences provide foundations for studying medical and health-related disciplines as well as environmental sciences and molecular biology.

The goals of the instructional program in the College of Agriculture and Life Sciences include providing relevant, scientific, and practical knowledge of the food, agricultural, and life sciences to its students. These programs emanate from a highly qualified and accomplished faculty committed to academic excellence and the development of the individuals to their personal and professional potential. Central to the college's goals is the cultivation of interdisciplinary problem-solving skills which will serve its graduates well as they pursue a lifetime of learning and adaptation to change.
The overall objectives of the academic program include the following:

- To provide an opportunity for a broad university education
- To provide a variety of learning experiences
- To offer a choice of specialization in agriculture and life sciences
- To provide background for graduate or professional programs

DEGREES

The bachelor of science degree is conferred upon the satisfactory completion of one of the curricula in this college.
The degrees of master of science, master of agriculture and master of life sciences are offered in the various departments in the college.
The doctor of philosophy degree is offered in the following subject areas: animal science, biochemistry, biological and agricultural engineering, botany, crop science, economics, entomology, food science, genetics, horticultural science, immunology, microbiology, natural resources, nutrition, physiology, plant pathology, sociology, soil science, toxicology, and zoology.

Further information on graduate offerings may be found in the *Graduate Catalog*.

CURRICULUM OFFERINGS AND REQUIREMENTS

A freshman enrolling in agriculture and life sciences has common core courses the first year - courses appropriate in all curricula. This approach allows the student time to explore various programs before selecting a curriculum. The student selects a major in a department or interdisciplinary program.
All departments offer *science* curricula (intended primarily for students who anticipate attending graduate or professional school), several *technology* curricula, and the agricultural business management curriculum is offered in the department of agricultural and resource economics.

DEPARTMENTAL MAJORS

Business-agricultural business management is offered through the Department of Agricultural and Resource economics. A concentration in biological sciences and the opportunity for double majoring in business and other programs are available.
Science-animal science, agricultural and extension education, applied sociology, biochemistry, biological engineering (joint program with the College of Engineering, biological sciences, botany, fisheries and wildlife sciences (joint program with the College of Forest Resources, food science, horticultural science, microbiology, poultry science, and zoology. Pre-professional courses are offered in the science curriculum track.
Technology-agricultural and environmental technology, animal science, food science, horticultural science and poultry science.

FRESHMAN YEAR

The curricula in the College of Agriculture and Life Sciences have a common freshman year with the exception of the science program offered through the Department of Biological and Agricultural Engineering. For the freshman year of that curriculum, see the College of Engineering.

ACADEMIC MINORS

Several departments in the College of Agriculture and Life Sciences offer a minor in their discipline. Students interested in additional information regarding a minor should contact the appropriate departmental office. At present, the following minors are available:

Minor	Department
Agricultural Business Management	Agricultural and Resource Economics
Agricultural Economics	
Agricultural Systems Technology	
Animal Science	Animal Science
Applied Sociology	Sociology and Anthropology
Biological Sciences	Biological Sciences
Botany	Botany
Entomology	Entomology
Crop Science	Crop Science
Food Science	Food Science

Genetics	Genetics
Horticultural Science	Horticultural Science
Microbiology	Microbiology
Nutrition	Food Science
Poultry Science	Poultry Science
Soil Science	Soil Science
Zoology	Zoology

INTERDEPARTMENTAL AND INTERDISCIPLINARY PROGRAMS

These curricula offer the opportunity to select broad curriculum majors that involve two or more departments or colleges.

Agronomy -a technical curriculum dealing with the fundamentals of crop production and soil management. The curriculum is administered by the departments of crop science and soil science.

Biological sciences - a curriculum with emphasis on biological and physical sciences, especially designed for graduate or professional courses requiring a biology background.

Environmental sciences -a curriculum concerned with the development of new and more efficient ways to maintain and enhance the world's environments for society's benefit including ecological, technical and economic approaches. The curriculum is administered jointly by the college of Agriculture and Life Sciences and the College of Physical and Mathematical Sciences.

Natural Resources -A curriculum concentrating on the use, management and improvement of natural resources. The curriculum is administered jointly by the College of Agriculture and Life Sciences, the College of Forest Resources and the College of Physical and Mathematical Sciences.

In addition to these cited curricula, a number of arrangements are available that provide the student an opportunity to select areas of course concentration.

STUDENT ACTIVITIES

Students in the College of Agriculture and Life Sciences have numerous opportunities to take part in broadening extracurricular activities. Most departments have student organizations that provide professional as well as social experience. Representatives of these clubs form the Agri-Life Council. This council is the student organization representing the College. Student tours provide an opportunity to see firsthand the application of classroom principles.

In addition, students representing agrimarketing, agronomy, animal science, horticultural science, food science, poultry science and soil science compete regionally and nationally in a number of activities, providing student members a chance to learn by travel as well as by participation.

HONORS PROGRAM

The College of Agriculture and Life Sciences has a comprehensive honors program for qualified students throughout their academic careers. Both seminar discussion programs covering broad topics and an independent research program are included. Faculty provide direction on an individual basis to each student with the students selecting their projects.

Participation in the CALS Honors Program is limited to CALS students with a GPA of 3.35 or above. The following ALS courses, 398H, 498H, 499H, are required. In addition, a student must take at least six hours of honors course work (at least 3 credits outside CALS) or participate in the University Scholars Program for at least two semesters. Honors course work must be completed with a "C" or better.

JOINT COLLEGE HONORS PROGRAM

The Department of Biochemistry's Honors Program, which is administered through the College of Agriculture and Life Sciences and the College of Physical and Mathematical Sciences, is designed to encourage excellent undergraduate biochemistry majors to develop their academic potential through a selection of courses and research that will challenge their abilities and better prepare them for postgraduate careers.

To be admitted to this program, a student must have at least a 3.500 overall GPA, including grades B or better in calculus (MA 141, 241, 242), general chemistry (CH 101, 102, 201, 202), organic chemistry (CH 221, 223), and calculus-based physics (PY 205, 208). To complete the program, the student must take two semesters of physical chemistry (CH 431, 433), and earn at least three credit hours in biochemically-related research. A written scientific report based on the student's research is required. A minimum of 9 credit hours must be drawn from at least two of the following three categories:

- designated Honors courses, such as BCH 454H
- advanced courses, such as 500-level courses in related fields
- research, such as BCH 492, BCH 493, or ALS 498H and 499H

HONOR SOCIETIES

Students in all majors with strong academic records are recognized by national organizations that have local chapters, Gamma Sigma Delta, Alpha Zeta, Alpha Epsilon Delta and Phi Kappa Phi.

SCHOLARSHIP PROGRAM

The College of Agriculture and Life Sciences awards approximately 350 scholarships each year on a combination of selection factors including merit, financial need and leadership.

JEFFERSON SCHOLARS IN AGRICULTURE/LIFE SCIENCES AND THE HUMANITIES (See College of Humanities and Social Sciences)

The Thomas Jefferson Scholars Program in Agriculture and Life Sciences and the Humanities is a joint program of the College of Agriculture and Life Sciences and the College of Humanities and Social Sciences. It is a double degree which permits participants to have two concentrations: one in an area of agriculture/life sciences and one in an area of humanities/social sciences. The double degree program may be individually designed to meet each student's particular interests and career goals. The purpose of the program is to produce potential leaders in agriculture and the life sciences who have not only technical expertise but also an appreciation for the social, political, and cultural issues that affect decision-making.

Each spring a number of entering freshmen are chosen to receive scholarships to participate in the Jefferson Program. In addition, other qualified students may choose to pursue a double major in agriculture/life sciences and the humanities under the Jefferson program.

Students interested in applying to the Jefferson Scholars program should contact either of the following people before January 15.

Dr. George T. Barthalmus, *Assaciate Dean*
College of Agricultural and Life Sciences
NCSU Box 7642
Raleigh, NC 27695
(919) 515-2614

Dr. Edward T. Funkhouser, *Assistant Dean*
College of Humanities and Social Sciences
NCSU Box 8101
Raleigh, NC 27695
(919) 515-2467

INTERNATIONAL STUDIES
An international seminar is offered to interested students. In addition, an international option, requiring a modern foreign language and 12 semester hours of appropriate courses in the social sciences, is available for students enrolled in any curricula.

DEPARTMENT OF AGRICULTURAL AND EXTENSION EDUCATION

www.cals.ncsu.edu/agexed/

Ricks Hall, Room 13A
Phone: (919) 515-2241

R. W. Shearon, *Head and Assistant Director, Cooperative Extension Service*
J. L. Flowers, *Coordinator of Advising*
R. T. Liles, *Associate Head*

Professors: G. W. Bostick, D. M. Jenkins, G. E. Moore, R. D. Mustian; *Associate Professors:* J.L. Flowers, R.T. Liles; *Extension Specialists-Educational Programs:* J. G. Richardson, B. G. Watts; *Extension Associates:* J.D. Gibson, E.B. Wilson; *Associate Faculty:* K.J. Gamble, R.C. King, T.T. McKinney, J.E. Mock; *Adjunct Faculty:* E.J. Boone, J. Lee, J. Sabella.

Agricultural and Extension Education is a broad field of study and practice representing the blending of agricultural and behavioral sciences into educational programs for youth and adults. Agriculture impacts everyone's life in terms of food, water, air, clothing, homes and the quality of life. Central to the department's goals is the formal and informal teaching of problem-solving and learning skills for a lifetime of growing, evolving, and changing.

Numerous professional improvement opportunities are available to people participating in departmental programs. Graduates have the choice to plan for teaching, administrative leadership and public relations positions in secondary schools, community colleges, Cooperative Extension, universities and agribusinesses. Graduates are highly qualified in agricultural and extension education and career placement assistance is provided all graduates.

CURRICULA
Agricultural education encompasses areas of study which will enable one to participate effectively in planning, promoting, and initiating educational programs in agriculture. The program leads t a Bachelor of Science degree and is designed to prepare teachers of agriculture for secondary schools and, community and technical colleges. The demand for agricultural education teachers exceeds present supply, in the Carolinas, Virginia, and throughout the nation.

The Agricultural Education/Agricultural Extension curriculum is designed to prepare individuals for careers in the extension service. It is offered as a program track under the Bachelor of Science degree in Agricultural and Extension Education. Students are required to complete both classroom and laboratory studies on the North Carolina State campus and a closely supervised practicum in the field. A 45-hour field work experience in an extension office or agriculture-related industry during the senior year is required.

The Agricultural Education/Communication Concentration is designed to prepare individuals for careers in professions related to communications in agriculture. It is offered as a concentration under the Bachelor of Science degree in Agricultural and Extension Education. Students are required to complete both classroom and laboratory studies on the North Carolina State campus and a closely supervised practicum in the field. A 45-hour field work experience in an agricultural industry during the sophomore year and a full-semester practicum experience in an agricultural-related industry during the senior year are required.

CURRICULUM IN AGRICULTURAL AND EXTENSION EDUCATION
TEACHER CONCENTRATION
Degree earned: B.S. in Agricultural and Extension Education

FRESHMAN YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
ALS 103 Intro. Topics in ALS	1	AEE (ED) 226 Instr. Technology for Agric. Ed	3
BIO 125 General Biology	4	ANS 150 Introduction to Animal Science	4
ENG 111 Comp. & Rhetoric	3	ENG 112 Comp. and Reading	3
EOE 101 Intro. to Occupational Education	1	Math Elective[2]	3
Comm/Speech Elective[1]	3	History Elective[3]	3
Math Elective[2]	3	Physical Education Elective	1
Any 100-level PE in Fitness & Wellness	1		17
	16		

SOPHOMORE YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
AEE (ED) 206 Intro. to Teach. Agriculture	3	Agricultural Concentration[4]	4
ARE 201 Intro. to Agriculture & Resouce Econ. *or*		Agricultural Concentration[4]	4
BAE 201 Shop Processes & Mgmt	3	Science, Tech., Society Req.[6]	3
EC 201 Prin. of Microeconomics	3	Humanities/Social Science Elective[7]	3
Agricultural Concentration[4]	3	Literature Elective[8]	3
Chemistry Elective[5]	4		17
	16		

JUNIOR YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
AEE (ED) 322 Exper. Learn. in Agriculture	2	AEE(ED)303 Adm./Sup of Student Org.	3
AEE (ED) 327 Conducting Summer Programs	1	ELP 344 School and Society	3
PSY 304 Educational Psychology	3	PSY 376 Developmental Psych. *or*	
SSC 200 Soil Science	4	PSY 476 Psych. of Adolescent Dev.	3
Agricultural Concentration[4]	3	SOC 305 Racial & Ethnic Relations	3
Forestry Elective *or*		Agricultural Concentration[4]	3
Plant Science Elective[9]	2-3	Philosophy, Religion, Visual/Perform Arts Elective[10]	3
	15-16		**18**

SENIOR YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
AEE (ED) 426 Methods of Teaching Agriculture	3	AEE (ED) 424 Planning Education Prog.	3
ECI 451 Teaching Sec. School Reading	2	AEE (ED) Student Teaching in Agriculture	8
Agricultural Concentration[4]	5-6	AEE (ED) 490 Senior Sem. in Agriculture Education	1
Free Electives[11]	6-8		**12**
	16-19		

Minimum Hours Required for Graduation: 128*

*Note. Students must have demonstrated foreign language proficiency at the FL_102 level.
[1]Select from approved Communication/Speech electives.
[2]Mathematical sciences elective list. One course must be a math course.
[3]Select from the History elective list.
[4]These courses must be selected from one of the approved concentrations.
[5]Select a chemistry course from the approved Natural Sciences courses.
[6]Select the approved science, technology, and society course for the concentration.
[7]Select from the approved list of Humanities and Social Sciences courses. One course in the curriculum must focus on a non-English speaking culture.
[8]Select from approved Literature electives.
[9]Either a forestry or a plant science elective may be required, depending upon the concentration selected. Contact the department for course required for specific concentrations.
[10]Select from the approved list of Philosophy, Religion, and visual & performing arts courses.
[11]Free elective requirements vary depending upon elective choices in the curriculum. Students must complete free electives in order for the total hours in the curriculum to equal 128.

AGRICULTURAL AND EXTENSION EDUCATION CONCENTRATIONS

Agricultural Business Concentration	**24 hrs.**
ARE 201 Introduction to Agriculture & Resource Econ. *or*	
EC 201 Principles of Microeconomics	3
ARE 210 Consumer Economics *or*	
BUS 225 Personal Finance	3
ARE 303 Farm Business Management *or*	
ARE 304 Agri. Business Management	3
ARE 306 Agricultural Law *or*	
ARE 309 Environmental Law *or*	
BUS 307 Business Law	3
ARE 311 Agricultural Markets *or*	
ARE 312 Agribusiness Marketing	3
ARE 321 Agricultural Financial Management	3
ARE Elective (must be ARE course)	3
Economics Elective (ARE, EC, BUS, ACC)	3

Agricultural Engineering Technology Concentration	**25 hrs.**
BAE 201 Shop Processes and Management	3
BAE 311 Agricultural Machinery and Power	4
BAE 323 Water Management	3
BAE 324 Elementary Surveying	1
BAE 332 Animal Facilities and Envir. Mgmt.	4
BAE 343 Agricultural Electrification	3
BAE 344 Circuits and Controls	1
BAE 432 Agricultural & Envir. Safety & Health	3
BAE Elective	3

Agronomy Concentration	**27 hrs.**
BIO 125, General Biology	4
CS 213 Crops Adaptation and Production	4
SSC 200 Soil Science	4
SSC 341 Soil Fertility and Fertilizers	3
SSC 342 Soil Fertility Lab	1
CS 411 Crop Ecology	3
CS 414 Weed Science	4
PP 315 Introduction to Plant Pathology	4

Animal Science Concentration	**24 hrs.**
ANS 150 Introduction to Animal Science	4
ANS 205 Anatomy & Phys. of Domestic Animals *or*	
ZO 150 Animal Diversity	3-4
ANS 215 Basic Agricultural Genetics *or*	
GN 301 Genetics in Human Affairs	3
ANS 230 Nutrition of Domestic Animals *or*	
ANS 250 Applied Animal Nutrition	4
Animal Science Elective	3
Select 6 hours from the following:	
ANS 402 Beef Cattle Management	3
ANS 403 Swine Management	3
ANS 404 Dairy Cattle Management	3
ANS 406 Sheep Management	3
ANS 410 Equine Management	3

Botany Concentration	**23 hrs.**
BIO 125 General Biology	4
BO 200 Plant Life	4
BO 360 Introduction to Ecology	3
BO 365 Ecology Lab	1
BO 400 Plant Diversity	4
BO 403 Systematic Botany	4
ZO 221 Conservation of Natural Resources	

Horticultural Science Concentration	**24 hrs.**
BO 200 Plant Life	4
HS 201 Principles of Horticulture	3
HS 301 Plant Propagation	4
HS 411 Nursery Management *or*	
HS 440 Greenhouse Management	3
HS 421 Tree Fruit Production *or*	
HS 422 Small Fruit Production *or*	
HS 431 Vegetable Production	3-4
HS 442 Floriculture II	3
Horticultural Science Elective	3

Natural Resources Concentration	**27 hrs.**	PO 351 Evaluation of Poultry Products	2
BO 200 Plant Life	4	PO 322 Muscle Foods and Eggs	3
SSC 185 Land and Life	3	PO 410 Prod and Mgmt of Game Birds	3
SSC Soil Science	4	PO 420 Turkey Production	2
FOR 110 Introduction to Forestry *or*		PO 422 Incubation and Hatchery Mgmt	2
FOR 252 Intro. to Forest Science	2-3	PO 423 Broiler Production	2
FW (ZO) 221 Conservation for Natural Res.	3	PO 430 Poultry Breeding	3
FW (ZO) 353 Wildlife Management	3		
ARE 336 Intro to Resource and Envir. Economics	3	**Zoology Concentration**	**26 hrs.**
BO 360 Introduction to Ecology	3	BIO 125 General Biology	4
BO 365 Ecology Lab	1	BO 200 Plant Life	4
		ZO 150 Animal Diversity	4
Poultry Science Concentration	**26 hrs.**	ZO 221 Conservation of Natural Resources	3
BIO 125 General Biology	4	ZO 250 Animal Anatomy	4
PO 201 Poultry Science and Production	4	ZO 353 Wildlife Management	3
PO 201 Poultry Science Seminar	1	Zoology Elective	3-4
PO 301 Evaluation of Live Poultry *or*			

CURRICULUM IN AGRICULTURAL AND EXTENSION EDUCATION, AGRICULTURAL EXTENSION CONCENTRATION
Degree earned: B.S. in Agricultural and Extension Education

FRESHMAN YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
ALS 103 Intro. Topics in ALS	1	ANS 150 Intro. to Animal Science	4
BIO 125 General Biology	4	ENG 112 Composition & Reading	3
ENG 111 Composition & Rhetoric	3	Agriculture Elective[5]	3
Comm./Speech Elective[1]	3	History Elective[2]	3
Math Elective[3]	3	Math Elective[3]	3
Any 100-level PE in Fitness & Wellness[4]	1	Physical Education Elective	1
	14		**17**

SOPHOMORE YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
AEE 492 External Learning Exp.	3	AEE (ED) 226 Inst. Technology in Agriculture Education	3
BAE 201 Shop Processes & Mgmt	3	ARE 201 Intro. to ARE *or*	
Chemistry Elective[6] *or*		EC 201 Economics I	3
PY 211 College Physics I	4	FOR 110 Intro. to Forestry *or*	
Humanities or Social Science Elective[8]	3	FOR 252 Intro. to Forest Science	2-3
Literature Elective[8]	3	Philosophy, Religion Visual/Perform. Arts Elective[10]	3
	16	Natural Science Elective[9]	3-4
			14-16

JUNIOR YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
AEE 323 Leadership Dev. in Agric	2	PSY 304 Educational Psychology	3
AEE 311 Comm. Method & Media	3	Agricultural Elective[5]	3
ARE 303 Farm Mgmt	3	Agricultural Specialty[11]	3
BAE 323 Water Mgmt *or*		Humanities or Social Science Elective[7]	3
SSC 200 Soil Science	3-4	Free Elective	3
Agricultural Specialty[11]	3	Free Elective	3
Plant Science Elective[12]	3		**18**
	17-18		

SENIOR YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
COM 226 Intro. to Public Relations	3	AEE 423 Prac. in Agricultrue Ext/Indust.	8
AEE (ED) 426 Meth. of Teaching Agric	3	AEE 478 Ext. as Non-Form. Education	3
Agricultural Specialty[11]	3	AEE (ED) 490 Seminar in AEE	3
Agricultural Specialty[11]	3		**12**
Free Elective	3		
	15		

Minimum Hours Required for Graduation: 124*

*Note. Students must have demonstrated foreign language proficiency at the FL_102 level.

[1]Select from approved communication/speech electives.
[2]Select history (HI) courses from the history elective list.
[3]Mathematical sciences elective list. One course must be a math course.
[4]The first two PE credits do not count toward graduation.
[5]Select from Group C electives in agriculture or agriculture and resource economics courses.
[6]Select a Chemistry course from the approved natural sciences courses.

[7]Select from the approved list of humanities and social sciences courses. Must focus on a non-English speaking culture.
[8]Select from approved literature electives.
[9]Select from approved list of natural science electives. Two of the three science courses must be laboratory courses.
[10]Select from the approved list of philosophy, religion, and visual & performing arts courses.
[11]Requires a minimum of twelve (12) semester hours from one area of agriculture or from forestry. These courses must be in addition to courses completed as natural science requirements or courses in the agricultural content area.
[12]Select from courses in botany, crop science, forestry or horticulture.

CURRICULUM IN AGRICULTURAL AND EXTENSION EDUCATION, COMMUNICATION CONCENTRATION
Degree earned: B.S. in Agricultural and Extension Education

FRESHMAN YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
ALS 103 Intro. Topics in ALS	1	AEE (ED) 226 Instr. Technology in Agric. Ed.	3
COM 110 Public Speaking	3	ANS 150 Intro. to Animal Science	4
ENG 111 Comp. and Rhetoric	3	BIO 125 General Biology	4
History Elective[1]	3	ENG 112 Comp. and Reading	3
Math Elective[2]	3	Math Elective[2]	3
Any 100-level PE in Fitness & Wellness[3]	1	Physical Education Elective[3]	1
	14		**17**

SOPHOMORE YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
BAE 201 Shop Processes & Mgmt	3	COM 201 Theories of Persuasive Comm	3
AEE 492 External Learning in AEE	3	FOR 110 Intro. to Forestry *or*	
Agricultural Specialty[4</SUP>	3	FOR 252 Intro. to Forest Science	2-3
Chemistry Elective[5]	4	SSC 200 Soil Science	4
ARE 201 or EC 201	3	Humanities/Social Science Elective[6]	3
	16	Literature Elective[7]	3
			16-17

JUNIOR YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
AEE 311 Comm. Methods & Media	3	AEE 323 Lead Dev. in Agriculture	2
COM 326 Public Relations App.	3	COM 226 Intro. to Public Relations	3
Agricultural Elective[7]	3	AEE 470 Agricultural Communications	3
Agricultural Specialty[3]	3	Agricultural Specialty[4]	3
Humanities/Social Science Elective[5]	3	Plant Science Elective[10]	3
Social Science Elective[8]	3	Philosophy, Religion, Visual/Perform. Arts Elective[11]	3
	18		**17**

SENIOR YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
AEE (ED) 426 Methods of Teach. Agriculture	3	AEE 423 Pract. in Agriculture Ext/Industry	8
COM 316 Comm. Techniques for PR	3	AEE (ED) 490 Seminar in AEE	1
COM 456 Organizational Comm.	3	Free Elective	3
Agricultural Specialty[3]	3		**12**
Free Elective	3		
	15		

Minimum Hours Required for Graduation: 125*

***Note:** Students must have demonstrated foreign language proficiency at the FL_102 level.

[1]Select history (HI) courses from the history elective list.
[2]Mathematical sciences elective list. One course must be a math course.
[3]Requires a minimum of 12 semester hours from one area of agriculture or from forestry. These courses must be in addition to courses from the agricultural content area or courses used to satisfy natural science requirements.
[4]Select a chemistry course from the approved natural sciences courses.
[5]Select from the approved list of humanities and social sciences courses. One course must focus on a non-English speaking culture.
[6]Select from approved literature electives.
[7]Select from agricultural and resource economics courses or Group C electives in agriculture.
[8]Select from approved list of politics and government courses or sociology courses.
[9]Select from courses in botany, crop science, forestry or horticulture.
[10]Select from the approved list of philosophy, religion, and visual & performing arts courses.

DEPARTMENT OF AGRICULTURAL AND RESOURCE ECONOMICS

www.ag-econ.ncsu.edu
Nelson Hall, Room 232
Phone: (919) 515-3107

J. A. Brandt, *Head*
C. L. Moore, *Associate Head and Extension Leader*
A. W. Oltmans, *Coordinator of Undergraduate Programs*
W. N. Thurman, *Administrator of Economics Graduate Programs*

William Neal Reynolds Professor: M.K. Wohlgenant, *Professors:* J.A. Brandt, G.A. Carlson, L.E. Danielson, J.E. Easley, E. A. Estes, B.K. Goodwin, T.J. Grennes, M.T. Holt, T. Johnson, C.L. Moore, C.D. Safley, R.A. Schrimper, W.N. Thurman, M.L. Walden, M. K. Wohlgenant; *Adjunct Professor:* J.B. Hunt, Jr.; *Professors Emeriti:* R.C. Brooks, A.J. Coutu, D.G. Harwood Jr., D.M. Hoover, L.A. Ihnen, R.A. King, H.L. Liner, T.E. Nichols Jr., D.F. Neuman, E.C. Pasour, Jr., G.R. Pugh, J. A. Seagraves, R.L. Simmons, J.G. Sutherland (USDA), W.D. Toussaint, W.L. Turner, C.R. Weathers, R.C. Wells, J.C. Williamson Jr.; *Associate Professors:* G.A. Benson, A.B. Brown, P.L. Fackler, M.C. Marra, A.W. Oltmans, M.A. Renkow, T. Vukina, G.A. Wossink, K.D. Zering; *Associate Professors Emeriti:* J.G. Allgood, R.S. Boals, H.C. Gilliam Jr., D.D. Robinson, P.S. Stone; *Assistant Professors:* A. Inoue, D.J. Phaneuf, N.E. Piggott, R.A. Ward; *Assistant Professors Emeriti:* J. C. Matthews Jr., E.M. Stallings; *Lecturers:* A.M. Beals Jr., J.S. Russ, H.A. Sampson, III; *Adjunct Instructors:* R.R. Gelblum, J.H. Kirch, J.M. Kuszaj, E.C. Murphy, M. Wohlgenant; *Extension Specialists:* T.A. Feitshans, G. van der Hoeven, L.S. Smutko, R.H. Usry.

The Department of Agricultural and Resource Economics serves agricultural, resource and related industries through its extension, research and teaching programs. Applying principles of economics and related disciplines, these programs develop understanding of contemporary economic and business problems and equip students with knowledge of business organization fundamentals and decision-making skills useful in the operation and management of business firms.

The department offers undergraduate programs leading to a Bachelor of Science degree in Agricultural Business Management. A concentration in biological sciences business management is offered within the agricultural business management program. The department also offers concentrations within two campus-wide degree programs: a natural resources economics and management concentration leading to a Bachelor of Science degree in Natural Resources (see natural resources curriculum) and an economic policy concentration leading to a Bachelor of Science degree in Environmental Sciences (see environmental sciences curriculum).

The Agricultural Business Management Program prepares graduates for management, marketing, sales, finance and related careers. The program has sufficient flexibility to provide more extensive course work in basic and applied science and math for those students desiring to prepare for advanced graduate study as well. The concentration in biological sciences business management prepares graduates for management, marketing, and sales careers in fields such as biotechnology, pharmaceuticals, health care, environmental protection, food processing and finance dealing with biological issues. This concentration is designed to be an attractive option for students with a strong background and interest in science who seek alternatives to technical science careers.

OPPORTUNITIES

The growing number of specialized business firms producing and marketing services and products in agriculture, resource and life science-related industries has created an increasing demand for graduates trained in agricultural an biological sciences business management, resource economics and management and environmental policy. Employment opportunities include careers with companies purchasing, processing and marketing food, fiber and related products; firms producing and marketing production inputs (feed, equipment, chemicals, drugs, etc.) and services; banks; other financial and credit agencies; cooperatives; natural resources management units and consulting firms; and natural resources and environmental educational and regulatory agencies.

Many graduates pursue careers in research and education with various state and federal government agencies. These agencies include the Cooperative Extension Service, the Agricultural Research Service, the State Department of Agriculture and Consumer Services, Environmental and Natural Resources, the United States Department of Agriculture and the Environmental Protection Agency.

CURRICULUM IN AGRICULTURAL BUSINESS MANAGEMENT

Degree earned: B. S. in Agricultural Business Management

FRESHMAN YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
ALS 103 Intro. Topics in ALS	1	ARE 201 Intro. to Agri. & Res. Economics	3
BIO 105 Biology in Modern World *and*		ENG 112 Composition and Reading	3
BIO 106 Biology in Modern World *or*		MA 114 Intro. to Finite Math Applications	3
BIO 125 General Biology	4	COM 110, 112, 146 *or* 211	3
ENG 111 Composition and Rhetoric	3	Humanities/Social Science Elective[2]	3
MA 107 Precalculus I	3		**15**
Any 100-level PE in Fitness & Wellness[1]	1		
Humanities/Social Science Elective[2]	3		
	15		

SOPHOMORE YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
BAE 121 Computer Applications *or*		ACC 210 Accounting 1 *or*	
CSC 200 Intro. to Computers & Uses	3	ACC 280 Managerial Accounting	3
CH 101 Chemistry – A Molecular Science	3	PY 131 Conceptual Physics *or*	
CH 102 General Chemistry Lab	1	PY 211 College Physics	4
EC 202 Economic Problems and Issues	3	Biological Science Elective[3]	3
MA 121 Elements of Calculus *or*		Humanities/Social Science Elective[2]	3
MA 131 Analytic Geom. & Calculus A	4	Free Elective	3
Physical Education Elective[1]	1		**16**
	15		

JUNIOR YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
ARE(EC) 301 Intermediate Microeconomics	3	ARE 311 Agricultural Markets *or*	
ARE 303 Farm Bus. Mgmt. *or*		ARE 312 Agribusiness Marketing	3
ARE 304 Agribusiness Mgmt.	3	BUS (ST) 350 Economics & Bus. Statistics *or*	
ARE 306 Agricultural Law *or*		ST 311 Introduction to Statistics	3
ARE 309 Environ. Law	3	EC 302 Intermediate Macroeconomics *or*	
ARE 490 Career Seminar in ARE	1	EC 304 Intro. to Fin. Markets &Institutions *or*	
Humanities/Social Science Elective[2]	3	EC 348 Intro. to International Economics	3
Technical Agricultural Elective[4]	3	ENG 332 Comm. for Business &Management	3
	16	Technical Agricultural Elective[4]	3
			15

SENIOR YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
ARE 321 Agric. Financial Mgmt. *or*		ARE 433 U.S. Agricultural Policy	3
BUS 320 Financial Mgmt.	3	BUS 330 Human Res. Mgmt. *or*	
ARE Elective	3	BUS 335 Organizational Behavior *or*	
Department[5] *or* Technical Agric.[4] Electives	3	EC 431 Labor Economics	3
Technical Agric. Electives[5]	3	Departmental[5] *or* Technical Agric.[4] Electives	6
Free Elective	2	Humanities/Social Science Elective[2]	3
	15		**15**

Minimum Hours Required for Graduation: 120

Note: A minimum grade of C is required in ENG 111 and ENG 112. A grade point average of 2.0 in all ARE, ACC, BUS, EC and ECG courses attempted, and **foreign language proficiency at the FL_102 level** are required to be eligible for graduation. **One course from the Science, Technology, and Society (STS) lists are required** for graduation; elect from either Humanities and Social Science or Science and Technology Perspective lists.

[1]Two semester hours of PE with at least one at Fitness & Wellness 100-level. Additional hours can be used as free electives.

[2]Humanities/Social Sciences Electives include five courses from the following GER lists: History & Literature: 2; Philosophy, Religion or Visual & Performing Arts: 1; Humanities/Social Sciences: 1; Social Sciences: 1. Also, **One of these courses must be from the GER non-English speaking culture list.** One may be from Science, Technology and Society (STS) list.

[3]From GN 301, NTR 301, *or* SSC 200 *or* Group A list in CALS section of Catalog. May be used to fulfill STS requirement.

[4]Elect from Group C list in CALS section of Catalog *or* Forestry courses. May be used to fulfill STS requirement.

[5]ARE (except ARE 401 & ARE 403), ACC, BUS, EC *or* ECG courses, *or* other courses approved by Undergraduate Coordinator. May be used to fulfill STS requirement.

CURRICULUM IN AGRICULTURAL BUSINESS MANAGEMENT, BIOLOGICAL SCIENCES CONCENTRATION
Degree earned: B.S. in Agricultural Business Management

FRESHMAN YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
ALS 103 Intro. to Topics in ALS	1	ARE 201 Intro. Agric. & Res. Economics	3
BIO 125 General Biology *or*		CH 101 Chemistry – A Molecular Science	3
BIO 183 Introductory Biology II	4	CH 102 General Chemistry Lab	1
ENG 111 Comp. and Rhetoric	3	ENG 112 Comp. & Reading	3
MA 121 Elements of Calculus *or*		MA 114 Intro. to Finite Math. *or*	
MA 131 Analytic Geom. & Calculus A	3	MA 231 Analytic Geom. & Calculus B	3
Any 100-level PE in Fitness & Wellness[1]	1	Physical Education Elective	1
Humanities/Social Science Elective[2]	3		**14**
	15		

SOPHOMORE YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
BAE 121 Computer Applications in ALS *or*		ACC 220 Accounting II *or*	
CSC 200 Intro. to Computers & Uses	3	ACC 220 Accounting II	3
CH 201 Chemistry – A Quantitative Science *and*		BO 200 Plant Life *or*	
CH 202 Quantitative Chemistry Lab *or*		MB 351 General Microbiology *and*	
CH 220 Introductory Organic Chemistry *or*		MB 352 Microbiology Lab	4
CH 221 Organic Chemistry I	4	BUS (ST) 350 Economics & Bus. Statistics *or*	
ZO 150 Animal Diversity *or*		ST 311 Intro. to Statistics *or*	
ZO 160 Intro. Cell & Dev. Zoology	4	ST 361 Intro. Statistics for Engineers	3
COM 110, 112, 146, *or* 211	3	PY 131 Conceptual Physics *or*	
	14	PY 211 College Physics I	4
		Social Science Elective[2,5]	3
			17

JUNIOR YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
ARE (EC) 301 Intermediate Microeconomics	3	ARE 311 Agricultural Markets *or*	
ARE 306 Agricultural Law *or*		ARE 312 Agribusiness Marketing *or*	
ARE 309 Environ. Law & Economics Policy	3	BUS 360 Marketing Methods	3
ARE 490 Career Seminar in ARE	1	BO 360 Intro. to Ecology and	
GN 301 Genetics in Human Affairs *or*		BO 365 Ecology Lab *or*	
GN 411 Prin. of Genetics	3-4	BO 400 Plant Diversity *or*	
HI 322 Rise of Modern Science *or*		ZO 250 Animal Anatomy and Phy. *or*	
HI 341 Technology in History	3	ZO 450 Evolutionary Biology	3-4
Restricted Elective (ARE)[3]	3	Philosophy, Religion *or* V & P Arts Elective[2]	3
	16-17	History or Literature Elective[2]	3
		Restricted Elective (ARE or CALS)[4,5]	3
			15-16

SENIOR YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
ARE 321 Agricultural Financial Mgmt. *or*	3	BUS (EC) 310 Managerial Economics	3
BUS 320 Financial Mgmt.		ENG 331 Comm. for Engr. & Technology *or*	
COM 201 Persuasion Theory	3	ENG 332 Comm. for Bus. & Mgmt. *or*	
EC 302 Intermediate Microeconomics *or*		ENG 333 Comm. for Science & Research	3
EC 304 Intro to Financial Mkts & Inst *or*		Restricted Elective (ARE or CALS)[3,4]	3
EC 348 Intro to International Econ.	3	Free Electives	4
Restricted Elective (ARE or CALS)[3,4]	6		**13**
	15		

Minimum Hours Required for Graduation: 120

Note: A minimum grade of C in ENG 111 and ENG 112, a grade point average of 2.000 in all ACC, ARE, BUS, EC and ECG courses attempted, **and foreign language proficiency at the FL_102 level** are required to be eligible for graduation. One course from the General Education Requirement (GER) lists for **Science, Technology, and Society** (STS) lists is required for graduation: select from Humanities and Social Sciences Perspective list or Science and Technology Perspective list. HI 322, HI 342, BO(ZO) 360/365, GN 301 or Restricted Elective courses can be used.

[1]Two semester hours of PE with at least one at the Fitness & Wellness 100-level. Additional hours can be used as free electives.

[2]One Humanities and Social Science elective must be from **the non-English speaking culture course** list.

[3]Restricted electives (ARE) include all ARE Courses (except ARE 401 and ARE 403) and 500-level ECG courses.

[4]Restricted electives (CALS) include all undergraduate courses offered within the College of Agriculture and Life Sciences.

[5]Psychology, Politics and Government, Sociology, Anthropology, and Cultural Geography.

MINOR IN AGRICULTURAL BUSINESS MANAGEMENT

The Department of Agricultural and Resource Economics offers a minor in Agricultural Business Management. This minor provides students an opportunity to learn basic concepts useful in many careers in agricultural business. A total of 15 hours of coursework is required, including ARE 201, and four additional courses chosen from a list of selected courses in agricultural and resource economics and related business fields. Consult the Department for specific information.

CURRICULA IN AGRONOMY

D. A. Knauft, *Head of the Department of Crop Science*
J. L. Havlin, *Head of the Department of Soil Science*
C. D. Raper Jr., *Director of Graduate Programs, Soil Science*
R. P. Patterson, *Undergraduate Coordinator--Crop Science*
H. J. Kleiss, *Undergraduate Coordinator--Soil Science*
R. C. Rufty, *Director of Graduate Programs--Crop Science*

Agronomy is the development and practical application of plant and soil sciences to produce abundant, high quality food, feed, fiber and specialty crops in an environmentally sustainable manner. Agronomists serve a vital role in global agriculture and the maintenance of environmental quality. Students may earn a Bachelor of Science degree within the technology curriculum of the College of Agriculture and Life Sciences with a major in Agronomy. The agronomy curriculum is administered jointly by the Departments of Crop Science and Soil Science. Crop Science relates primarily to the genetics, breeding, physiology and management of field crops and turf. Soil Science is oriented toward soil physics, chemistry, origin, microbiology, fertility and management. For further information and employment opportunities, see the departmental headings for Crop Science and Soil Science.

CURRICULUM IN AGRONOMY, AGRONOMIC SCIENCES CONCENTRATION
Degree earned: B.S. in Agronomy

FRESHMAN YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
ALS 103 Intro. Topics in ALS	1	BO 200 Plant Life	4
BIO 125 General Biology	4	CH 101 A Molecular Science	3
ENG 111 Comp. & Rhetoric	3	CH 102 General Chemistry Lab	1
MA 131 Calculus for Life and Mgmt. Science A	3	ENG 112 Comp. & Reading	3
Any 100-level PE in Fitness & Wellness[1]	1	MA 132 Comp. Math for Life & Mgmt. Science	1
Humanities/Social Science Elective[2]	3	MA 231 Calculus for Life & Mgmt. Science	3
	16	Humanities/Social Science Elective[2]	3
			17

SOPHOMORE YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
BAE 121 Comp. Appl. in Agric. & Life Science *or*		ARE 201 Intro. to Agric. Res. Economics	3
CSC 200 Intro. to Computers & Their Uses *or*		CH 221 Organic Chemistry I	4
ST 311 Intro. to Statistics	3	CS 213 Crops: Adaptation & Production	4
CH 201 Chemistry - A Quantitative Science	3	Humanities/Social Science Elective[2]	3
CH 202 Quantitative Chemistry Lab	1	Writing/Speaking Elective[3]	3
COM 110 Public Speaking	3		17
SSC 200 Soil Science	4		
Physical Education Elective[1]	1		
	15		

JUNIOR YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
CH 223 Organic Chemistry II	4	BO 421 Plant Physiology	4
CS 414 Weed Science	4	GN 411 Prin. of Genetics	4
SSC 341 Soil Fertility & Fertilizers	3	SSC 452 Soil Classification	4
SSC 342 Soil Fertility Lab	1	Humanities/Social Science Elective[2]	3
Humanities/Social Science Elective[2]	3		15
	15		

SENIOR YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
BCH 451 Prin. of Biochemistry	4	CS 413 Plant Breeding	2
CS 411 Environ. Aspects of Crop Production	2	CS(SSC) 490 Senior Seminar	1
CS 415 Agronomic Pest Mgmt. Systems	3	MB 351 General Microbiology	4
ENT 425 General Entomology *or*		Humanities/Social Science Elective[2]	3
PP 315 Prin. of Plant Pathology	3-4	Free Elective	3-4
PY 211 College Physics I	4		13-14
	16-17		

Minimum Hours Required for Graduation: 125[4]

[1]Four semester hours of (PE) physical education (including any 100-level Fitness & Wellness) credit are required for graduation; the first two hours may be counted for free elective credit. If a student chooses not to count these first two hours as free elective, these hours will not count toward graduation and two additional hours of free electives must be completed.

[2] Humanities and Social Sciences Requirements are 21 hours of courses as follows:

A. Two courses from the History and Literature Electives Lists.

B. One course from the Philosophy, Religion, or Visual and Performing Arts Electives Lists.

C. One course from the Psychology, Politics and Government, Sociology, Anthropology, or Cultural Geography Elective Lists.

D. Two courses from any of the above lists or the Humanities and Social Sciences (Additional) Electives List.

E. One course among those elected to fulfill the Humanities and Social Sciences requirements must focus on non-English speaking culture.

F. It is suggested that one course elected to fulfill the Humanities and Social Sciences requirements also come from the Science, Technology, and Society (Humanities and Social Sciences Perspective) elective list. If not taken as a Humanities and Social Sciences Elective, then a course from this list must be taken as a Free Elective.

[3]The Writing and Speaking Elective requirement includes (1) course from the Advanced Writing Electives List or the Communication/Speech Electives List.

[4]Foreign Language proficiency at the FL_102 level is required for graduation.

CURRICULUM IN AGRONOMY, AGRONOMIC BUSINESS CONCENTRATION

Degree earned: B.S. in Agronomy

FRESHMAN YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
ALS 102 Intro. Topics in ALS	1	BO 200 Plant Life	4
BIO 125 General Biology	4	CH 101 Chemistry - A Molecular Science	3
ENG 111 Comp. & Rhetoric	3	CH 102 General Chemistry Lab	1
MA 121 Elements of Calculus	3	ENG 112 Comp. & Reading	3
Any 100-level PE in Fitness & Wellness[1]	1	MA 132 Comp. Math for Life & Mgmt. Science	1
Humanities/Social Science. Elective[2]	3	BAE 121 Comp. Appl. in Agric. & Life Science *or*	
	15	CSC 200 Intro. to Computers and Their Uses *or*	
		ST 311 Intro. to Statistics	3
		Humanities/Social Science. Elective[2]	3
			18

SOPHOMORE YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
ARE 201 Intro. Agric. Res. Economics	3	ACC 280 Managerial Accounting	3
CH 201 Chemistry - A Quantitative Science	3	CH 220 Intro. Organic Chemistry	4
CH 202 Quantitative Chemistry Lab	1	CS 213 Crops: Adaptation & Production	4
COM 110 Public Speaking	3	Humanities/Social Science Elective[2]	3
SSC 200 Soil Science	4	Writing/Speaking Elective[3]	3
Physical Education Elective[1]	1		**17**
	15		

JUNIOR YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
CS 414 Weed Science	4	ANS(HS) 215 Basic Agricultural Genetics *or*	
ENT 425 General Entomology *or*		GN 301 Genetics in Human Affairs	4
PP 315 Prin. of Plant Pathology	3-4	BO 421 Plant Physiology	3
PY 211 College of Phyics 1	4	EC 202 Economic Problems & Issues	3
SSC 341 Soil Fertility & Fertilizers	3	SSC 452 Soil Classification	1
SSC 342 Soil Fertility Lab	1		**14**
	15-16		

SENIOR YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
ARE 303 Farm Mgmt.	3	CS 462 Soil-Crop Mgmt. Systems	3
ARE 311 Agricultural Markets	3	CS (SSC) 490 Senior Seminar	1
CS 411 Crop Ecology	3	Humanities/Social Science. Elective[2]	3
CS 415 Argonomic Pest Mgmt. Systems	3	Humanities/Social Science. Elective[2]	3
Humanities/Social Science. Elective[2]	3	Free Electives	6-7
	15		**16-17**

Minimum Hours Required for Graduation: 125[4]

[1]Two credit hours of PE (including any 100-level Fitness & Wellness) are required for graduation

[2]The Humanities and Social Sciences Requirements are 21 hours of courses as follows:

A. Two courses from the History and Literature Electives Lists.

B. One course from the Philosophy, Religion, or Visual and Performing Arts Electives Lists.

C. One course from the Psychology, Politics and Government, Sociology, Anthropology, or Cultural Geography Elective Lists.

D. Two courses from any of the above lists or the Humanities and Social Sciences (Additional) Electives List.

E. One course among those elected to fulfill the Humanities and Social Sciences requirements must focus on non-English speaking culture.

F. It is suggested that one course elected to fulfill the Humanities and Social Sciences requirements also come from the Science, Technology, and Society (Humanities and Social Sciences Perspective) elective list. If not taken as a Humanities and Social Sciences Elective, then a course from this list must be taken as a Free Elective.

[3]The Writing and Speaking Elective requirement includes one course from the Advanced Writing Electives List or the Communication/Speech Electives List.

[4]Foreign Language proficiency at the FL_102 level is required for graduation.

CURRICULUM IN AGRONOMY, CROP PRODUCTION CONCENTRATION
Degree earned: B.S. in Agronomy

FRESHMAN YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
ALS 102 Intro. Topics in ALS	1	BO 200 Plant Life	4
BIO 125 General Biology	4	CH 101 Chemistry - A Molecular Science	3
ENG 111 Comp. & Rhetoric	3	CH 102 General Chemistry Lab	1
MA 121 Elements of Calculus	3	ENG 112 Comp. & Reading	3
Any 100-level PE in Fitness & Wellness[1]	1	MA 132 Comp. Math for Life & Mgmt. Science	1
Humanities/Social Science. Elective[2]	3	BAE 121 Comp. Appl. in Agric. & Life Science *or*	
	15	CSC 200 Intro. to Computers and Their Uses *or*	3
		ST 311 Intro. to Statistics	3
		Humanities/Social Science. Elective[2]	
			18

SOPHOMORE YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
CH 201 Chemistry - A Quantitative Science	3	ARE 201 Intro. Agric. Res. Economics	3
CH 202 Quantitative Chemistry Lab	1	CH 220 Intro. Organic Chemistry	4
COM 110 Public Speaking	3	CS 213 Crops: Adaptation & Production	4
SSC 200 Soil Science	4	PY 211 College Physics 1	4
Humanites/Soc.ScienceElective[2]	3		**15**
Physical Education Elective[1]	1		
	15		

JUNIOR YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
CS 312 Grassland Mgmt.	3	ANS 215 (HS) Basic Agricultural Genetics	3
CS 414 Weed Science	4	BO 421 Plant Physiology	4
ENT 425 General Entomology *or*		SSC 452 Soil Classification	4
PP 315 Prin. of Plant Pathology	3-4	Humanities/Social Science. Elective[2]	3
SSC 341 Soil Fertility & Fertilizers	3	Writing/Speaking Elective[1]	3
SSC 342 Soil Fertility Lab	1		17
	14-15		

SENIOR YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
ARE 303 Farm Mgmt.	3	CS 413 Plant Breeding	2
CS 411 Crop Ecology	3	CS 462 Soil-Crop Mgmt. Systems	3
CS 415 Argonomic Pest Mgmt. Systems	3	CS (SSC) 490 Senior Seminar	1
SSC 461 Physical Properities of Plant Growth	3	Humanities/Social Science. Elective[2]	3
Humanities/Social Science. Elective[2]	3	Free Electives	6-7
	15		15-16

Minimum Hours Required for Graduation: 125[4]

[1]Two credits of PE (including any 100-level Fitness & Wellness) are required for graduation.
[2]The Humanities and Social Sciences Requirements are 21 hours of courses as follows:
A. Two courses from the History and Literature Electives Lists.
B One course from the Philosophy, Religion, or Visual and Performing Arts Electives Lists.
C. One course from the Psychology, Politics and Government, Sociology, Anthropology, or Cultural Geography Elective Lists.
D. Two courses from any of the above lists or the Humanities and Social Sciences (Additional) Electives List.
E. One course among those elected to fulfill the Humanities and Social Sciences requirements must focus on non-English speaking culture.
F. It is suggested that one course elected to fulfill the Humanities and Social Sciences requirements also come from the Science, Technology, and Society (Humanities and Social Sciences Perspective) elective list. If not taken as a Humanities and Social Sciences Elective, then a course from this list must be taken as a Free Elective.
[3]The Writing and Speaking Elective requirement includes (1) course from the Advanced Writing Electives List or the Communication/Speech Electives List.
[4]Foreign Language proficiency at the FL_102 level is required for graduation.

CURRICULUM IN AGRONOMY, SOIL SCIENCE CONCENTRATION
Degree earned: B.S. in Agronomy

FRESHMAN YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
ALS 102 Intro. Topics in ALS	1	BO 200 Plant Life	4
BIO 125 General Biology	4	CH 101 Chemistry - A Molecular Science	3
ENG 111 Comp. & Rhetoric	3	CH 102 General Chemistry Lab	1
MA 121 Elements of Calculus	3	ENG 112 Comp. & Reading	3
Any 100-level PE in Fitness & Wellness[1]	1	MA 132 Comp. Math for Life & Mgmt. Science	1
Humanities/Social Science. Elective[2]	3	BAE 121 Comp. Appl. in Agric. & Life Science *or*	
	15	CSC 200 Intro. to Computers and Their Uses *or*	
		ST 311 Intro. to Statistics	3
		Humanities/Social Science. Elective[2]	3
			18

SOPHOMORE YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
CH 201 Chemistry - A Quantitative Science	3	ARE 201 Intro. Agric. Res. Economics	3
CH 202 Quantitative Chemistry Lab	1	CH 220 Intro. Organic Chemistry	4
COM 110 Public Speaking	3	CS 213 Crops: Adaptation & Production	4
SSC 200 Soil Science	4	Writing/Speaking Elecitve[3]	1
MEA 101 Geology I: Physical	3	Free Elective	3
MEA 110 Geology I Lab	1		17
Physical Education Elective[1]	1		
	16		

JUNIOR YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
CS 414 Weed Science	4	ANS 215 (HS) Basic Agricultural Genetics	3
PY 211 College Physics I	4	SSC 452 Soil Classification	4
SSC 341 Soil Fertility & Fertilizers	3	Humanities/Social Science. Elective[2]	3
SSC 342 Soil Fertility Lab	1	Humanities/Social Science. Elective[2]	3
Humanities/Social Science. Elective[2]	3	Free Elective	3
	15		16

SENIOR YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
BAE (SSC)323 Water Mgmt.	3	BO 421 Plant Physiology *or*	(4)
BAE 324 Elementary Surveying	1	CS 462 Soil-Crop Mgmt. Systems	3
CS 411 Crop Ecology	3	SSC (CS) 490 Senior Seminar	3
CS 415 Agronomic Pest Mgmt. Systems	3	SSC 361 Role Soils in Envir. Mgmt.	3
SSC 461 Soil Phys. Propert. of Plant Growth	3	Humanities/Social Science. Elective[2]	1
	15		3
			14

Minimum Hours Required for Graduation: 126[4]

[1]Two credits of PE (including any 100-level Fitness & Wellness) are required for graduation.
[2]The Humanities and Social Sciences Requirements are 21 hours of courses as follows:
A. Two courses from the History and Literature Electives Lists.
B. One course from the Philosophy, Religion, or Visual and Performing Arts Electives Lists.
C. One course from the Psychology, Politics and Government, Sociology, Anthropology, or Cultural Geography Elective Lists.
D. Two courses from any of the above lists or the Humanities and Social Sciences (Additional) Electives List.
E. One course among those elected to fulfill the Humanities and Social Sciences requirements must focus on non-English speaking culture.
F. It is suggested that one course elected to fulfill the Humanities and Social Sciences requirements also come from the Science, Technology, and Society (Humanities and Social Sciences Perspective) elective list. If not taken as a Humanities and Social Sciences Elective, then a course from this list must be taken as a Free Elective.
[3]The Writing and Speaking Elective requirement includes one course from the Advanced Writing Electives List or the Communication/Speech Electives List.
[4]Foreign Language proficiency at the FL_102 level is required for graduation.

CURRICULUM IN AGRONOMY, TURFGRASS MANAGEMENT CONCENTRATION
Degree earned: B.S. in Agronomy

FRESHMAN YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
ALS 102 Intro. Topics in ALS	1	BO 200 Plant Life	4
BIO 125 General Biology	4	CH 101 Chemistry - A Molecular Science	3
ENG 111 Comp. & Rhetoric	3	CH 102 General Chemistry Lab	1
MA 121 Elements of Calculus	3	ENG 112 Comp. & Reading	3
Any 100-level PE in Fitness & Wellness[1]	1	MA 132 Comp. Math for Life & Mgmt. Science	1
Humanities/Social Science. Elective[2]	3	BAE 121 Comp. Appl. in Agric. & Life Science *or*	
	15	CSC 200 Intro. to Computers and Their Uses or	
		ST 311 Intro. to Statistics	3
		Humanities/Social Science Elective[2]	3
			18

SOPHOMORE YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
CH 201 Chemistry - A Quantitative Science	3	ARE 201 Intro. Agric. Res. Economics	3
CH 202 Quantitative Chemistry Lab	1	CH 220 Intro. Organic Chemistry	4
COM 110 Public Speaking	3	SSC Soil Science	4
CS 200 Intro. to Turf Mgmt.	4	Humanities/Social Science. Elective[2]	3
CS 213 Crops: Adaptation & Production	4	Writing/Speaking Elecitve[3]	3
Physical Education Elective[1]	1		17
	16		

JUNIOR YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
CS 414 Weed Science	4	ANS (HS) 215 Basic Agricultural Genetics *or*	
ENT 425 General Entomology *or*		GN 301 Genetics in Human Affairs	3
PP 315 Prin. of Plant Pathology	3-4	BO 421 Plant Physiology	4
SSC 341 Soil Fertility & Fertilizers	3	PY 211 College Physics I	4
SSC 342 Soil Fertility Lab	1	SSC 452 Soil Classification	4
Humanites/Soc.Science Elective[2]	3		15
	14-15		

SENIOR YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
CS 400 Turf Cultural Systems	3	CS 415 Agronomic Pest Mgmt. Systems	3
CS 411 Crop Ecology	3	CS (SSC) 490 Senior Seminar	1
SSC 461 Soil Physical Prop. of Plant Growth	3	HS 342 Landscape Horticulture or	
Humanities/Social Science. Elective[2]	3	HS 471 Trees & Grounds	3-4
Humanities/Social Science Elective[2]	3	Free Electives	7-8
	15		14-16

Minimum Hours Required for Graduation: 124[4]

[1]Two credits of PE (including any 100-level Fitness & Wellness) are required for graduation.
[2]The Humanities and Social Sciences Requirements are 21 hours of courses as follows:
A. Two courses from the History and Literature Electives Lists.
B. One course from the Philosophy, Religion, or Visual and Performing Arts Electives Lists.
C. One course from the Psychology, Politics and Government, Sociology, Anthropology, or Cultural Geography Elective Lists.
D. Two courses from any of the above lists or the Humanities and Social Sciences (Additional) Electives List.
E. One course among those elected to fulfill the Humanities and Social Sciences requirements must focus on non-English speaking culture.
F. It is suggested that one course elected to fulfill the Humanities and Social Sciences requirements also come from the Science, Technology, and Society (Humanities and Social Sciences Perspective) elective list. If not taken as a Humanities and Social Sciences Elective, then a course from this list must be taken as a Free Elective.
[3]The Writing and Speaking Elective requirement includes (1) course from the Advanced Writing Electives List or the Communication/Speech Electives List.
[4]Foreign Language proficiency at the FL_102 level is required for graduation.

DEPARTMENT OF ANIMAL SCIENCE

Polk Hall, Room 123
Phone: (919) 515-2755

K.L. Esbenshade, *Head*

Alumni Distinguished Professors: J.C. Cornwell, K.L. Esbenshade, W.L. Flowers; *William Neal Reynolds Professor:* E.J. Eisen; *Professors:* L.S. Bull, R.G. Crickenberger, R.L. McCraw, B.T. McDaniel, R.A. Mowrey Jr., R.M. Petters, O.W. Robison, J.W. Spears, L.W. Whitlow; *Adjunct Professor:* S.D. Perreault; *Professors Emeriti:* A.V. Allen, R.F. Behlow, T.C. Blalock, D.G. Braund, K.R. Butcher, E.V. Caruolo, D.G. Davenport, R.W. Harvey, W.L. Johnson, E.E. Jones, J.R. Jones, F.N. Knott, C.A. Lassiter, J.M. Leatherwood, J.G. Lecce, C.L. Markert, R.D. Mochrie, R.M. Myers, G.S. Parsons, J.W. Patterson, A.H. Rakes, H.A. Ramsey, F.D. Sargent, F.H. Smith, C.M. Stanislaw, J.C. Wilk, G.H. Wise, J.R. Woodard; *Associate Professors:* B.P. Alston-Mills, J.H. Eisemann, C.E. Farin, B.A. Hopkins, Hopkins, R.E. Lichtenwalner, W.E.M. Morrow, J. Odle, M.H. Poore, M.T. See, S.P. Washburn; *Visiting Associate Professor:* G.G. Gomez; *Adjunct Associate Professors:*M.T. Coffey, E.C. Segerson; *Associate Professors Emeriti:* E.U. Dillard, J.J. McNeil; *Assistant Professors:* S.L. Ash, V. Fellner, R.J. Harrell, G.B. Huntington, J.R. Kubiak, J.M. Luginbuhl, J.A. Moore, E. van Heugten, T.A. van Kempen, C.S. Whisnant, C.M. Williams; *Lecturer:* M. Yoder; *Extension Specialists:* B.C. Allison, J.S. Clay, G.R. Griffin, D.C. Miller, D.E. Pritchard; *Extension Specialist Emeritus:* J.H. Gregory, J.W. Parker, R.W. Swain; *Associate Members of the Faculty:* G.W. Almond (Food Animal and Equine Medicine, CVM), L.S. Bull (International Programs), G.A. Benson (Agricultural and Resource Economics); J.C. Burns (USDA); J.C. Cornwell (CALS Academic Programs), R.G. Crickenberger (Agriculture and Natural Resources); W.M. Hagler (Plant Pathology, Poultry Science); D.K. Larick (Food Science); B.R. Poulton (Curriculum & Instruction); M.D. Whitacre (Food Animal and Equine Medicine, CVM).

Animal Science is a broad field centered on the biology, production, management, and care of domestic animals. Animals have, throughout history, provided man with a major source of food, fiber, pleasure and companionship. Undergraduate students study subjects related to various phases of animal science. Courses are offered in anatomy, physiology, nutrition, genetics, and management, and there are opportunities for the application of basic scientific training in the husbandry areas. Options for course selection by each student make it possible for those with varying backgrounds and wide-ranging interests to become involved in stimulating and rewarding experiences.

OPPORTUNITIES

Opportunities for animal scientists are boundless and the areas of emphasis are diverse. Animal science graduates are qualified for positions in a wide variety of areas such as: livestock production, animal management, feed and animal health product companies, livestock marketing, food processing industries, feedlot managers, management consultants, state and federal departments of agriculture, breed associations, education, financial institutions, livestock publications, technical service managers, animal technicians, media specialists, agricultural extension service and public relations. Animal scientists can be found across the nation and around the world in all phases of production, research, sales, service, business and education. Many students in pre-veterinary medicine obtain degrees in animal science. Students may elect graduate study, after which they will find opportunities in teaching, research, and extension. See listing of graduate degrees offered.

CURRICULA

The degree of Bachelor of Science with a major in animal science may be obtained under either the science or industry curricula offered in the College of Agriculture and Life Sciences. The science curriculum (SAS) is designed for students with interest in advanced study in disciplines such as physiology, nutrition, and genetics. Many students in pre-veterinary medicine are enrolled in this curriculum pursuing a Bachelor of Science Degree in Animal Science. The industry (IAS) curriculum is for students interested in entry into the animal industry or allied businesses. It offers flexibility in complementing animal science with business, economics, and applied science course work.

MINOR IN ANIMAL SCIENCE

A minor in Animal Science is open to all interested baccalaureate students. This minor is appropriate for (but not limited to) students majoring in Agricultural Business Management, Agricultural Economics, Agricultural Education, Agronomy, Food Science, Poultry Science and Zoology. Students completing a minor in Animal Science will become familiar with animal production and with its related industries. The minor requires a minimum of 15 credit hours with a grade of C or better, including 8 hours in required courses and 7 hours in elective courses. The program is flexible in order that students may emphasize the discipline or species of their interest.

INDUSTRY CURRICULUM IN ANIMAL SCIENCE
Degree earned: B.S. in Animal Science

FRESHMAN YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
ALS 103 Intro. Topics in ALS	1	CH 101 Chemistry - A Molecular Science	3
ANS 150 Intro. to Animal Science	4	CH 102 General Chemistry Lab	1
BIO 125 General Biology	4	ENG 112 Comp. & Reading	3
ENG 111 Comp. & Rhetoric	3	MA 114 Intro. Finite Math Appl. *or*	
MA 107 Precalculus I	3	MA 121 Elements of Calculus *or*	
Any 100-level PE in Fitness & Wellness[1]	1	MA 131 Calculus for Life and Mgmt. Science A	3
	16	Free Elective	3
		Physical Education Elective	1
			14

SOPHOMORE YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
ANS 205 Anatomy & Phys. of Domestic Animals	3	ANS 220 Repro., Lact. & Behav. of Dom. Anim.	4
ANS (HS) 215 Basic Agricultural Genetics	3	CH 220 Intro. Organic Chemistry *or*	
ARE 201 Intro. to Agric. Res. Economics *or*		CH 221 Organic Chemistry I	4
EC 205 Fund. of Economics	3	ST 311 Intro. to Statistics *or*	
CH 201 Chemistry – A Quantitative Science	3	ST(BUS) 350 Econ. & Bus. Statistics	3
CH 202 Quantitative Chemistry Lab	1	ANS Applied Science & Tech. Elective [3]	3
Comm/Speech Elective[2]	1	History Elective [4]	3
	16		**17**

JUNIOR YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
ANS 230 Nutrition & Growth of Dom. Animals	4	Restricted Electives[6]	8
PY 131 Conceptual Physics	4	Economics or Bus. Elective[5]	3
Economics or Bus. Elective[5]	3	ANS Applied Science & Tech. Elective [3]	2
Free Electives	6	Literature Elective [7]	3
	17		**16**

SENIOR YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
ANS Management Elective [8]	3	ANS Discipline Elective[10]	3
Humanities/Social Science. Electives[9]	9	ANS Mgmt. Elective[8]	3
Restricted Elective[6]	3	Humanities/Social Science. Elective[9]	3
	15	Restricted Elective[6]	3
		Free Elective	3
			15

Minimum Hours Required for Graduation: 126

[1]Two semester hours of PE credit are required for graduation. One of these courses must be a Fitness & Wellness 100-level.
[2]Select COM 110, Public Speaking, or COM 112, Interpersonal Communication, or COM 146, Business and Professional Communication or COM 211 Argumentation and Advocacy.
[3] Course must be selected from the list of approved Animal Science Applied Science and Technology courses. Total of 5 credit hours is required from the following:

ANS 105, Intro. to Companion Animals (3)
ANS 110, Intro. to Equine Science (3)
ANS 201, Techniques of Animal Care (2)
ANS 202, Techniques of Horse Care (2)
ANS 210, Microcomputers Animal Prod. (2)
ANS 303, Prin. of Equine Evaluation (3)
ANS (FS) 322, Muscle Foods & Eggs (3)
ANS (FS) 324, Milk & Dairy Products (2)
ANS (PO) 425, Feed Mill Mgmt. (3)
VMF 420, Diseases of Farm Animals (3)

[4]Course must be selected from the approved GER History Electives List.
[5]Economics or Business Elective
A. One course in management or marketing selected from the following:

ARE 303 Farm Management
ARE 304 Agribusiness Management
ARE 311 Agricultural Markets
ARE 312 Agribusiness Marketing

B. One course from the following:

ACC 280 Managerial Accounting
ARE 303 Farm Management
ARE 304 Agribusiness Management
ARE 306 Agricultural Law
ARE 309 Environmental Law
ARE 311 Agricultural Markets
ARE 312 Agribusiness Marketing
ARE 321 Agricultural Financial Management
BUS 307 Bus. Law
BUS 310 Managerial Economics
BUS 320 Financial Management
BUS 330 Human Resource Management
BUS 360 Marketing Methods

[6] Restricted Electives must be chosen from Groups A,B or C as listed in the University Bulletin.
[7] Course must be selected from the approved GER Literature Electives List. 8 Students must select at least two animal management course from the following list:

ANS 400, Companion Animal Mgmt (3)
ANS 402, Beef Cattle Mgmt. (3)
ANS 403 Swine Management (3)
ANS 404 Dairy Cattle Management (3)
ANS 410 Equine Management (3)

[9] These courses must be selected from the approved GER list for Humanities and Social Sciences as follows:
Philosophy, Religion or Visual & Performing Arts (3)
Psychology or Politics and Government or sociology or anthropology or cultural geography (3)
Science, Technology & Society from a Humanities/Social Science Perspective (3)
The final 3 credits may be from any courses in the aforementioned categories or economics or history or literature or humanities/social sciences additional list.
At least one course in the Humanities and Social Sciences must focus on a non-English-speaking culture.
[10]Course must be selected from the list of approved Animal Science Discipline Courses. Total of 3 credit hours is required from the following:

ANS 340, Selection of Domestic Animals (3)
ANS 415, Comparative Nutrition (3)
ANS (NTR) 419, Human Nutrition (3)
ANS 452, Advanced Reprd. Physio. (3)
ANS 453, Growth & Dev. of Domestic Animals (3)
ANS 454, Lactation, Milk and Nutrition (3)

SCIENCE CURRICULUM IN ANIMAL SCIENCE
Degree earned: B.S. in Animal Science

FRESHMAN YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
ALS 103 Intro. Topics in ALS	1	CH 101 Chemistry - A Molecular Science	3
ANS 150 Intro. to Animal Science	4	CH 102 General Chemistry Lab	1
BIO 125 General Biology	4	ENG 112 Comp. & Reading	3
ENG 111 Comp. & Rhetoric	3	MA 121 Elements of Calculus *or*	
MA 107 Precalculus I	3	MA 131 Calculus for Life and Mgmt. Science A	3
Any 100-level PE in Fitness & Wellness	1	Free Elective	3
	16	Physical Education. Elective[1]	3
			14

SOPHOMORE YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
ANS 205 Anatomy & Physio. of Dom. Animals	3	ANS 220 Repro., Lact. & Behav. of Dom. Anim.	4
ANS (HS) 215 Basic Agricultural Genetics	3	CH 221 Organic Chemistry I	4
CH 201 Chemistry - A Quantitative Science	3	ST 311 Intro. to Statistics	3
CH 202 Quantitative Chemistry Lab	1	ANS Course [4]	3
ARE 201 Intro. to Ag & Resource Econ. *or*		History Elective[3]	3
EC 205 Fund. of Econ.	3		**17**
Comm./Speech Elective[2]	3		
	16		

JUNIOR YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
ANS 230 Nurtition of Domestic Animals	4	Restricted Elective (Group A, B or C) [9]	4
CH 223 Organic Chemistry II	4	GN 411 Prin. of Genetics	4
MB 351 General Microbiology	3	PY 212 College Physics II	4
MB 352 General Microbiology Lab	1	ANS Course [4]	2
PY 211 College Physics I	4	Literature Elective[5]	3
	16		**17**

SENIOR YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
ANS Discipline Course Elective [6]	3	ANS Discipline Course Elective [6]	3
Humanities/Social Science. Electives[7]	9	ANS Mgmt. Elective [8]	3
Free Elective	3	Humanities/Social Science. Electives[7]	3
	15	Free Electives	6
			15

Minimum Hours Required for Graduation: 126

[1]Two semester hours of PE credit are required for graduation. One of these courses must be a Fitness & Wellness 100-level.
[2] Select COM 110, Public Speaking, or COM 112, Interpersonal Communication, or COM 146, Business and Professional Communication, or COM 211, Argumentation and Advocacy.
[3] Course must be selected from the approved GER History Electives List.
[4] Select any Animal Science (ANS) course. Total of 5 credits is required.

[5] Course must be selected from the approved GER Literature Electives List.
[6] Course must be selected from the list of approved Animal Science Discipline courses. Total of 6 credits is required:

ANS 340, Selection of Domestic Animals (3)
ANS 415, Comparative Nutrition (3)
ANS (NTR) 419, Human Nutrition (3)
ANS 452, Advanced Reprd. Physio. (3)
ANS 453, Growth & Dev. of Domestic Animals (3)
ANS 454, Lactation, Milk and Nutrition (3)

[7] These courses must be selected from the approved GER listing for Humanities and Social Sciences as follows:
Philosophy, Religion, or Visual and Performing Arts (3 credits)
Psychology or Politics and Government or Sociology or Anthropology or Cultural Geography (3 credits)
Science, Technology, and Society from a Humanities and Social Science Perspective (3 credits)
The final 3 credits may be from any courses in the aforementioned categories or Economics or History or Literature or Humanities/Social Sciences Additional List.
At one course in the Humanities/Social Sciences must focus on a non- English speaking culture.
[8] Students must select at least one animal management course from the following list:
ANS 400, 402, 403, 404, 410.
[9] Students planning to apply to a college of veterinary medicine should take BCH 451 (Prin. of Biochemistry) to fill the A,B,C elective category. Many graduate schools also require biochemistry.

DEPARTMENT OF BIOCHEMISTRY

www.cals.ncsu.edu/biochem/

Polk Hall, Room 128
Phone: (919) 515-2581

D.T. Brown, *Head and Director of Graduate Programs*
J.A. Knopp, *Undergraduate Coordinator*

William Neal Reynolds Professor: W.L. Miller; *Professors:* P.F. Agris, E.S. Maxwell, J.D. Otvos, E.C. Sisler, P.L. Wollenzien; *Adjunct Professors:* K. S. Korach, M. Luther, M. Milburn, E.C. Theil; *Professors Emeriti:* F.B. Armstrong, H. R. Horton, J.S. Kahn, I.S. Longmuir, E.C. Theil; *Associate Professors:* L.K. Hanley- Bowdoin, C.C. Hardin, C.L. Hemenway, J.A. Knopp; *Assistant Professors:* A.C. Clark, C. Mattos; *Visiting Assistant Professors:* D.G. Presutti, H.S. Gracz; *Associate Members of the Faculty:* H.M. Hassan (Microbiology), R.R. Sederoff (Forestry, Genetics), H.E. Swaisgood (Food Science), D.E. Sayers (Physics).

The Biochemistry is the science which is concerned with the discovery and understanding of the chemical principles of life. It is a wide ranging field from the composition, biosynthesis, structure and function of biomolecules to the control and regulation of biochemical processes within organelles, cells, organs and organisms. Biochemical principles form the basis of most laboratory procedures within the life sciences.

OPPORTUNITIES

The Biochemistry program provides B.S. graduates with the scientific background and skills required for employment in university, industrial, state, and federal research laboratories. The curriculum is especially suited to students preparing for graduate study in biochemistry, molecular biology, biotechnology, and genetics and for the health fields of medicine, veterinary science pharmacology and related fields.

HONORS AND AWARDS

H. Robert Horton Award This award is given to the outstanding student in Biochemistry based on scholarly and research achievements as selected by the Biochemistry graduate students.

HONORS IN BIOCHEMISTRY

The honors in Biochemistry program is jointly administered within the College of Agriculture and Life Sciences and the College of Physical and Mathematical Sciences. It is designed for those students who wish to explore advanced courses and be rewarded for outstanding academic achievement.

To be admitted to the honors program, a student must complete the three semester sequence of Calculus (MA 141, 241, 242) and the calculus based Physics sequence (PY 205 and 208). Exceptions can be made for transfer students. Students with a GPA of at least 3.5 are invited into the program in their Junior year. To complete the program, a student must take the two semester Physical Chemistry sequence (CH 431 and 433), at least three hours of research and six more hours of advanced or honors courses. Interested students should contact the Undergraduate Coordinator of Biochemistry for more detailed information.

CURRICULUM

The curriculum emphasizes the fundamentals of biological and physical sciences, offering students both breadth of knowledge and depth of understanding. It is designed to provide students with broad experience in biological and chemical sciences and to encourage the development of experimental skills. One important aspect is the requirement of at least one semester experience in a Biochemical laboratory. Because of the breadth of the course requirements, many students can easily add a second major in Biological Sciences, Chemistry, and other science as well as add a minor in Genetics.

CURRICULUM IN BIOCHEMISTRY

Degree earned: B.S. in Biochemistry

FRESHMAN YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
ALS 103 Intro. Topics in ALS	1	BIO 183 or Botany/Zoology Elective[2]	4
BIO 181 or 125 General Biology	4	CH 221 Organic Chemistry I	4
CH 101 Chemistry – A Molecular Science	3	ENG 112 Comp. & Reading	3
CH 102 General Chemistry 1 Lab	1	MA 231 Calculus for Life & Management Science *or*	
ENG 111 Composition & Rhetoric	3	MA 241 Analytic Geom. & Calculus II[1]	3-4
MA 131 Analytic Geom. & Calculus A *or*			**14-15**
MA 141 Analytic Geom. & Calculus I[1]	4		
	15-16		

SOPHOMORE YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
CH 223 Organic Chemistry II	4	CH 201 Chemistry – A Quantitative Science	3
MA 242 Analytic Geom. & Calculus III *or*		CH 202 Quantitative Chemistry Lab	1
ST 311 Intro. to Statistics[1]	3-4	PY 208 Physics for Engr. & Sc. II *or*	
PY 205 Physics for Engr. & Science I *or*		PY 212 College Physics II[3]	4
PY 211 College Physics I[3]	4	Computer, Math *or* Statistics Elective[6]	3
Biological Science Elective[2]	3-4	Humanities/Social Science. Elective[5]	3
Physical Education Elective[4]	1	Physical Education Elective[4]	1
	15-17		**15**

JUNIOR YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
BCH 451 Prin. of Biochemistry	4	BCH 453 Metabolism & Molecular Biology	3
BCH 452 Intro. Biochemistry Lab	2	ENG 331 Comm. for Engr. & Technology *or*	
GN 411 Prin. of Genetics	4	ENG 333 Advanced Writing[7]	3
Humanities/Social Science. Elective[5]	3	MB 351 General Microbiology	3
Free Elective[1]	3	MB 352 General Microbiology Lab	1
	16	Cell Biology or Physiology Elective[8]	3-4
		Humanities/Social Sciences Elective[5]	3
			16-17

SENIOR YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
BCH 454 Advanced Biochemistry Lab or		CH 433 Physical Chemistry II *or*	
Research Elective[9]	3-4	Advised Elective II[10]	3
CH 331 Intro. Physical Chemistry or		Humanities/Social Sciences Electives[5]	6
CH 431 Physical Chemistry I[10]	3-4	Lab Analysis Elective[11]	3-4
Humanities/Social Sciences Elective[5]	3	Free Elective	0-3
Free Elective(s)	3-6		**12-16**
	15-17		

Minimum Hours Required for Graduation[2]: 124

[1]There are two sequences of math classes (for a total of 12 hours): 3-semester calculus sequence, MA 141,241,242 which is prerequisite to CH 431 and CH 433, and is strongly recommended for students who plan *graduate studies in Biochemistry* and MA 131, MA 231, ST 311 plus an additional 3 hour advised math elective.
[2]The preferred sequence is BIO 181, BIO 183 and one course from the following list: ZO 250, ZO 208, ZO 212, BO 250 or BO 213. Alternative sequences include: BIO 125, ZO 150 and BO 200 or BO 213; ZO 150 and ZO 250. Botany or Zoology elective to be selected from BO 200, BO 213, BO 250, ZO 201, ZO 205, or ZO 208.
[3]There are two sequences of physics classes: the calculus-based physics sequence, PY 205 and PY 208, which is recommended for students who plan *graduate studies in Biochemistry* and PY 211 and PY 212.
[4]Two PE credits are required for graduation, one of which must be at the 100-level.
[5]To be selected from GER list. Two courses from the GER History and Literature Electives Lists; one course from the GER Philosophy, Religion, or Visual & Performing Arts Electives Lists; one course from the GER Economics Electives List; one course from the GER Psychology, Politics & Government, Sociology, Anthropology, or Cultural Geography Electives Lists; one additional course selected from any Humanities or Social Sciences Electives; and one course that must focus on Science and Technology from a humanities/social perspective.
[6]An advised elective course in computer science (CSC 200, BAE 121, etc.), in mathematics (with a calculus prerequisite) or in statistics.
[7]To be selected from the GER Advanced Writing-Major Paper Requirement Options: ENG 331 or ENG 333.
[8]Cell Biology/Physiology electives include BO 421 (4 cr), PO 405 (4 cr), ZO 421 (3 cr), and ZO(BO) 414 (3 cr).
[9]Research electives may be selected from BCH 492 or BCH 493 or ALS 498H and ALS 499H. (Research only).
[10]The 2-semester Physical Chemistry sequence, CH 431 and CH 433, is recommended for students who plan graduate studies in Biochemistry.
[11]Lab Analysis electives include CH 315 (4 cr), CH 428 (3 cr), and FS 403 (3 cr). BCH 454 (4 cr) may also be selected as a Lab Analysis elective by students who take at least 3 credit hours of Research elective(s).

DEPARTMENT OF BIOLOGICAL AND AGRICULTURAL ENGINEERING

David S. Weaver Laboratories Room 100
Phone: (919) 515-2694

D. B. Beasley, *Head*
R. O. Evans, Jr., *Department Extension Leader*
J. H. Young, *Director of Graduate Programs*
C. G. Bowers, Jr., *Undergraduate Coordinator*

Distinguished University Professor and William Neal Reynolds Professor: R.W. Skaggs;*Professors:* C.F. Abrams Jr., J.C. Barker, D.B. Beasley, R.W. Bottcher, C.J. Bowers Jr., F.J. Humenik, E.G. Humphries, W.H. Johnson, G.J. Kriz, W.F. McClure, R.P. Rohrbach, A.R. Rubin, R.S. Sowell, L.F. Strikeleather, P.W. Westerman, T.B. Whitaker (USDA), D.H. Willits, J.H. Young;*Adjunct Professors:* F.E. Barton II, L.M. Safley Jr., S.S. Schiffman, L.M. Sykes; *Professors Emeriti:* G.B. Blum Jr., H.D. Bowen, J.W. Dickens, L.B. Driggers, J.M. Fore, G.W. Giles, E.L. Howell, F.M. Richardson, R.E. Sneed, C.W. Suggs, R.W. Watkins, E.H. Wiser; *Associate Professors:* G.R. Baughman, S.M. Blanchard, M.D. Boyette, R.O. Evans, Jr., R.L. Huffman, G.D. Jennings, J.E. Parsons; *Visiting Associate Professors:* G.T. Roberson, J. Spooner, *Assistant Professors:* J. Cheng, J.J. Classen, S.A. Hale;*Adjunct Assistant Professors:* D.D. Archibald, R.L. Langley, S.K. Seymour; *Senior Researcher:* S.C. Mohapatra: *Extension Specialists:* E.J. Hewett, III, W.F. Hunt, D.E. Line,

R.L. McLymore, J.M. Rice, R.E. Sheffield, R.L. Sherman; *Associate Members of the Faculty:* C.R. Daubert (Food Science), B.E. Farkas (Food Science), A.E. Hassan (Forestry), T.M. Losordo (Zoology), S.C. Roe (Companion Animal & Special Species Medicine), K.R. Swartzel (Food Science).

The department offers Bachelors of Science in Biological Engineering, and Agricultural and Environmental Technology. Biological engineering "brings engineering to life" and applies engineering to biological systems. Students analyze and develop solutions to unique problems of biological and agricultural systems. An area of concentration in the Biological Engineering Curriculum can be chosen whereby scientific and engineering principles are applied to problems in a particular area. The Biological and Agricultural Engineering department may be viewed on the World Wide Web at: http://www2.ncsu.edu/bae

OPPORTUNITIES

The Biological Engineering Curriculum provides opportunities for students to conceptualize, design, and develop systems for producing, processing, and packaging a high quality food supply, maintaining a high quality environment, and improving the quality of life for people and animals, will provide many opportunities for graduates of the biological engineering curriculum. Jobs can be in design, development, research, outreach, or sales in public institutions and in industry. Examples include food engineers for food processing companies, biological engineers for biomedical companies, design engineers for agricultural equipment companies, and environmental engineers for government environmental agencies, industry, or engineering consulting firms. This curriculum, accredited by the Engineering Accreditation Commission of the Accreditation Board for Engineering and technology (ABET), also provides adequate training for post-graduate work leading to advanced degrees in a variety of engineering fields.

The Agricultural and Environmental Technology Curriculum provides graduates opportunities in the technical analysis, application and evaluation of agricultural production systems and their associated environmental systems. The curriculum's flexibility enables students to specialize technologically in agriculture, the environment, or business management. Careers include technical jobs in production agriculture, environmental systems, agribusiness sales and service, and agricultural extension agents.

CURRICULA

The curriculum provides an educational program for students which uniquely prepares them for dealing with engineering problems in the biological and agricultural areas. Flexibility in the program allows the student to choose electives which may lead to concentrations in the areas of (1) biological engineering, (2) agricultural engineering,(3) biomedical engineering, (4) bioprocess engineering, (5) environmental engineering, (6), or an emphasis area designed by the student and his/her advisor. Emphasis is placed on basic science and engineering courses such as mathematics, physics, chemistry, mechanics, biology, soils, and thermodynamics which provide a sound background for the application of engineering to biological problems.

The program is jointly administered by The College of Engineering and The College of Agriculture and Life Sciences in order to assure quality of basic training in both engineering and the life sciences. Undergraduate freshmen entering this curriculum should enroll in the College of Engineering undesignated program and indicate BEU as their curriculum choice. After successfully completing the Engineering undesignated requirements, the student will enter the Biological and Agricultural Engineering Department in the BE curriculum. For the Biological Engineering program, refer to the College of Engineering section of this catalog.

The Agricultural and Environmental Technology curriculum is intended to provide an educational program for students which uniquely prepares them for applying science, technology and business principles to efficiently manage agricultural and environmental systems. Flexibility within the program allows students to attain depth in science business, or environmental areas related to agricultural systems. Graduates are prepared to apply mechanical and information technology to production, agricultural and environmental issues or to other industries interfacing with natural resources or agriculture. They provide a critical link in the agricultural and environmental spectrum by interacting directly with both the production personnel as well as the designers and implementers of technological systems.

CURRICULUM IN AGRICULTURAL AND ENVIRONMENTAL TECHNOLOGY
Degree earned: B.S. in Agricultural and Environmental Technology

FRESHMAN YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
ALS 103 Intro. Topics in ALS	1	CH 101 Chemistry - A Molecular Science	3
BAE 121 Computer Applications in ALS	3	CH 102 General Chemistry Lab	1
ENG 111 Comp. & Rhetoric	3	ENG 112 Comp. and Reading	3
MA 131 Calc. for Life & Mgt. Science A	3	MA 231 Calc. for Life & Mgt. Science B	3
Humanities or Literature (2A)[1]	3	Humanities or Literature (2A)[1]	3
Any 100-level PE in Fitness & Wellness	1	GC 120 Found. of Graphics (2B)[1]	3
	14		16

SOPHOMORE YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
BIO 125 General Biology	4	SSC 200 Soil Science	4
CH 201 Chemistry - A Quantitative Science	3	BAE 201 Shop Processes & Mgmt.	3
CH 202 Quantitative Chemistry Lab	1	MA 114 Intro. to Finite Math	3
PY 211 College Physics I	4	PY 212 College Physics II	4
MA 232 Comp. Math for Life & Mgt. Science	1	Physical Education Elective	1
ARE 201 Intro. Agri. Res.Econ. (2C)[1]	3		15
	16		

JUNIOR YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
BAE (SSC) 323 Water Mgmt.	3	BAE 311 Agric. Mach. & Power Units	4
BAE (SSC) 324 Elementary Surveying	1	BAE 333 Processing Agric. Products	4
Agric. and Res. Economics Elective[3]	3	ST (BUS) 350 Economics & Bus. Statistics	3
Communication Elective[4]	3	Group A, B, and C Elective[2]	3
Group A, B, and C Elective[2]	3		14
Soc.Science Elective (2D)[1]	3		
	16		

SENIOR YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
BAE 343 Agric. Electrification	3	BAE 332 Animal Facilities & Env. Mgmt.	4
BAE 344 Circuits & Controls	1	BAE 442 Sys. Applic. Agric. & Environ. Issues	3
BAE 432 Agric. & Environ. Safety & Health	3	Agric. and Res. Economics Elective[3]	3
Group A, B, and C Elective[2]	3	Group A, B, and C Elective[2]	3
Group A, B, and C Elective[2]	3	Humanities/Social Science. Elective (2E)[1]	3
Humanities/Social Science. Elective (2F)[1]	3		16
	16		
		Minimum Hours Required for Graduation	**123**

[1]Twenty-one hours of Humanities & Social Sciences Electives are required as follows:
A.Two courses from the History Electives List and/or the Literature Electives List.
B.GC 120 meets the Philosophy Electives, Religion Electives, and Visual and Performing Arts Electives Lists.
C. ARE 201 Intro. to Agricultural and Resource Economics.
D.One course from the Psychology Electives, Politics and Government Electives, Sociology Electives, Anthropology Electives, and Cultural Geography Electives Lists
E.One course from Science, Technology and Social Sciences (Humanities & Social Science Perspective) List.
F. One course from any of the above Lists plus the Economics Electives List and the Humanities and Social Sciences (Additional) List.
Note: Of the five courses (in addition to ARE 201and GC 120) elected to fulfill the Humanities and Social Sciences one must focus on a non-English speaking culture.
[2]Group A,B and C Electives can emphasize agricultural, environmental or business areas and be effectively used for a minor.
[3]Choose from ARE 303, ARE 304, ARE 306, ARE 309, ARE 311, ARE 312, ARE 321 and ARE(EC) 336.
[4]Choose from COM 110, ENG 331, ENG 332, and ENG 333.
Other requirements:
- Foreign language proficiency at the FL_ 102 level is required for graduation.
- A major written paper in the junior and senior years (in BAE 323 in Jr. year, and in BAE 442 in the Sr. year).

MINOR IN AGRICULTURAL AND ENVIRONMENTAL TECHNOLOGY

This minor is offered to students interested in the application of engineering technology analysis in agricultural and environmental systems that utilize machinery, agricultural structures, food and feed processing, soil and water and waste management, electrical power and controls, and agricultural safety and health technology. This minor allows majors in other areas to understand engineering technology for equipment, materials, resources, processes and facilities utilized in their major area of study, and be knowledgeable in the application of technology for managing environmental issues, impacts and monitoring.

Objectives:

1. apply engineering and information technology to production agriculture and environmental systems
2. gain basic knowledge and understanding of engineering technology utilized in machine systems, environmental systems, materials, processes and structures
3. increase ability to efficiently manage technology in agriculture production, environmental systems, and safety and health.

At least one course must be selected from BAE 323, 332, or 432 (* on list) for awareness of environmental issues. Students may select from the following:

COURSE NUMBER	COURSE TITLE	CREDITS
BAE 201	Shop Processes and Mgmt.	3
BAE 311	Agricultural Machinery and Power Units	4
*BAE (SSC) 323	Water Management	3
BAE (SSC) 324	Elementary Surveying	1
*BAE 332	Animal Facilities and Environmental Mgmt.	4
BAE 333	Processing Agricultural Products	4
BAE 343	Agricultural Electrification	3
BAE 344	Circuits and Controls	1
*BAE 432	Agricultural and Environmental Safety and Health	3
BAE 442	Systems Approach to Agricultural and Environmental Issues	3
BAE (CE) 578	Agricultural Waste Mgmt.	3

Students seeking this minor must consult with the undergraduate coordinator of the Department of Biological and Agricultural Engineering on a plan of work and must submit and Application for Minor form to the coordinator at any time prior to the pre-registration deadline for the student's final semester.

CURRICULUM IN BIOLOGICAL SCIENCES

Bostian Hall, Room 2717

Robert Horton, *Interim Coordinator*

Professors: C. F. Lytle (Zoology), B. M. Parker (Entomology); *Associate Professors:* R. L. Beckmann Jr. (Botany), M. Niedzlek-Feaver (Zoology), B.C. Haning (Plant Pathology), J. E. Mickle (Botany); *Laboratory Supervisor:* P. M. Aune (Botony); *Laboratory Manager:* T. B. Johansson (Biological Sciences); *Teaching Technician:* W. P. Crumpler (Microbiology).

The Biological Sciences constitute a rapidly developing field offering many challenging and rewarding opportunities for well-trained students. The Biological Sciences Interdepartmental Program offers a B.S. degree in Biological Sciences for students seeking comprehensive training in biology and the supporting sciences.

Many graduates of this program continue further studies in graduate schools in such diverse fields as botany, zoology, marine biology, physiology, genetics, biochemistry, biotechnology, pharmacology, and microbiology. Others attend professional schools in medicine, optometry, and veterinary medicine as well as other health-related fields.

The Biological Sciences curriculum provides a modern, flexible undergraduate program to prepare students for rewarding careers in research and teaching as well as in business, industry, research institutes and governmental agencies. A wide range of career opportunities are available in technical sales, manufacturing and quality control, environmental management, and other positions with pharmaceutical companies, food manufacturers, medical laboratories, public utilities, and other industries.

Biological Sciences majors may elect a general program of study or the Nutrition concentration option. A joint program with the Department of Mathematics and Science Education leads to a double major and a teaching certificate.

MINOR IN BIOLOGICAL SCIENCES

The minor in Biological Sciences is open to all interested baccalaureate students with the exception of Zoology and Botany majors, but is intended primarily to enhance the programs of students whose major field is outside the Biological Sciences area. Students pursuing a minor in Biological Sciences will become familiar with fundamental principles of biology and gain a broad-based perspective of the biological sciences. The minor requires a minimum of 17 credit hours. The minor program is flexible so that students may take courses in areas of individual interest.

CURRICULUM IN BIOLOGICAL SCIENCES

Degree earned: B.S. in Biological Sciences

FRESHMAN YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
ALS 103 Intro. Topics in ALS	1	BIO 183 Intro. to Biology *or*	
BIO 125 General Biology *or*		Advised Elective	4
BIO 181 Intro. to Biology	4	CH 221 Organic Chemistry I	4
CH 101 Chemistry - A Molecular Science	3	ENG 112 Comp. and Reading	3
CH 102 General Chemistry Lab	1	MA 132 Comp. Math for Life & Mgmt. Science	1
ENG 111 Comp. and Rhetoric	3	MA 231 Calculus for Life & Mgmt. Science B *or*	
MA 131 Calculus for LIfe & Mgmt ScienceA *or*		MA 241 Calculus II	3-4
MA 141 Calculus I	3-4	Any 100-level PE in Fitness & Wellness[1]	1-
	15-16		**16-17**

SOPHOMORE YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
BAE 121 Computer Applications in ALS *or*		CH 201 Chemistry - A Quantative Science	3
CSC 200 Intro. to Computers and Uses *or*		CH 202 Quantitative Chemistry Lab	1
MA 242 Calculus III *or*		ENT 425 General Entomology *or*	
ST 311 Intro. to Statistics	3-4	ZO 150 Animal Diversity *or*	
BO 200 Plant LIfe *or*		ZO 250 Animal Anatomy & Physiology	4
BO 400 Plant Diversity	4	Humanities/Social Science. Elective[2]	3
CH 223 Organic Chemistry II	4	Free Electives	6
Humanities/Social Science. Elective[2]	3		**17**
Physical Education Elective[1]	1		
	15-16		

JUNIOR YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
BO 360 Intro. to Ecology *and*		ALS 498 Honors Research Teach.[5] *or*	
BO 365 Ecology Lab *or*		BIO 492 External Learning Experience *or*	
GN 411 Prin. of Genetics[3]	4	BIO 493 Special Problems in Bio. Science	3
PY 205 Physics for Engr. and Science I *or*		BCH 451 Intro. to Biochem.	4
PY 211 College Physics I	4	GN 411 Prin. Genetics *or*	
Humanities/Social Science. Electives[2]	6	ZO Evolution, Behavior and Ecology[3]	4
Writing/Speaking Elective[4]	3	GN 412 Elementary Genetics Lab	1
	17	PY 208 Physics for Engr. and Science II *or*	4
		PY 212 College Physics II	

SENIOR YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
BIO 490 Senior Seminar	1	MB 351 General Microbiology	3
Humanities/Social Science. Electives[2]	9	MB 352 Gen. Microbiology Lab	1
Physiology Elective[6]	3-4	Free Electives	8
Restricted Electives[7]	4	Restricted Electives[7]	0-3
	17-18		**12-15**

Minimum Hours Required for Graduation: 128

Foreign language proficiency at the FL_ 102 level is required for graduation.

[1]Two semesters hours of physical education (PE) credit are required for graduation. This requirement includes one 100-level course in Fitness and Wellness.
[2]The Humanities and Social Sciences requirements are 21 hours of courses as follows:
A.Two courses from the History and Literature electives lists. (may be either 2 History courses, 2 literature courses, or 1 history and 1 literature course)
B.One course from the Philosophy, Religion or Visual and Performing Arts Electives lists
C.Two courses from two of the following electives lists: Psychology; Economics; Politics and Government; Sociology; Anthropology; and Cultural Geography.(courses must be selected from different lists.)
D.One course from any of the above-named lists or from the Advanced Humanities and Social Sciences lists.
E.One course from Science, Technology and Society: Humanities and Social Sciences Perspective List (not Science and Technology Perspectives List).
F.One of the courses elected to fulfill the Humanities and Social Sciences Requirementmust focus on a non-
English speaking culture. This course may come from the Foreign Language Elective List.
Note: These lists of electives - The General Education Requirements - are available in the Biological Sciences office and on the World Wide Web at http://www2.ncsu.edu/ncsu/provost/info/academic_programs/ger/index.html
[3]Students may elect BO 360 General Ecology (3 hrs.) plus BO 365 Ecology Lab (1 hr,.) or ZO 260 Evolution, Behavior and Ecology (4 hrs.) All students are required to take GN 411 Principles of Genetics.
[4]The Writing and Speaking Elective requirement includes one course from the Advanced Writing Electives list, the Communication/Speech Electives list, or the Foreign Languages Elective list.
[5]Honors students electing ALS 498H typically follow this course with ALS 499H.
[6]Students may elect BO 421 Plant Physiology (4 hrs.) or ZO 421 Prin. of Physiology (3 hrs.) orBO (ZO) 414 Cell Biology (3 hrs.), orBO 480 Introduction to Plant Biotechnology (3 hrs.) or PO 405 Avian Physiology (4 hrs.) Students selecting ZO 421, BO (ZO) 414 or BO 480 arae encouraged to enroll in either ZO 375 Developmental Anatomy and Histology Lab I, or ZO 480 Laboratory Techniques in Cellular Biology or BCH 452 Introductory Biochemistry Laboratory in order to gain laboratory experience.
[7]Restricted Electives must be chosen from Groups A, B ,C or D in the CALS section of the Undergraduate Catalog.

NUTRITION CONCENTRATION

Degree earned: B.S. in Biological Sciences
The Nutrition concentration follows the general curricular requirements for the biological sciences program, except that students must take four courses in nutrition: FS 400, NTR 415, NTR 490, and NTR 516.

MINOR IN NUTRITION
Schaub Hall, Room 281
Phone: (919) 515-2968

The minor in Nutrition will provide knowledge of the principles of nutrition that are needed to formulate balanced diets and to evaluate information and policies concerning foods and dietary practices. Students may select courses to emphasize human or animal nutrition or a combination of these.

DEPARTMENT OF BOTANY

www.cals.ncsu.edu/botany

Gardner Hall, Room 2214
Phone: (919) 515-2727

E. Davies, *Head*
C.G.Van Dyke, *Undergraduate Coordinator*
N.S. Allen, *Director of Graduate Programs*

University Research Professor: W.F. Thompson; *Alumni Distinguished Undergraduate Professors:* R.L. Beckmann, C.G. Van Dyke; *Professors:* N.S. Allen, U. Blum, W.F. Boss, R.S. Boston, J.M. Burkholder, W.S. Chilton, R.C. Fites, H.E. Pattee (USDA), J.F. Thomas, C.G. Van Dyke, T.R.Wentworth; *Professors Emeriti:* C.E. Anderson, R.J. Downs, J.W. Hardin, W.W. Heck (USDA), R.L. Mott, G.R.Noggle, E.D.Seneca, J.R.Troyer; *Associate Professors:* R.L.Beckmann, J.E.Mickle, D.Robertson, J.M.Stucky; *Teaching Technician:* D.S.Wright, *Associate Members of the Faculty:* H.V.Amerson (Forestry), K.O.Burkey (USDA), M.M. Goodman (Crop Science, Statistics, Genetics), S.C. Huber (USDA), M.D. Purugganan (Genetics), T.W. Rufty Jr. (Crop Science), E.C. Sisler (Biochemistry), E.A. Wheeler (Wood and Paper Science), R.W. Whetten (Forestry); *Adjunct Associate Professor:* C.S. Brown, G.K. Muday.

The instructional program provides classroom, laboratory, and field experience in the major areas of plant science. Undergraduates majoring in botany are given a broad background in the humanities and physical sciences and are encouraged to participate in independent study in the senior year. Majors, as pre-professionals in the plant sciences, are prepared for advanced study in botany and other biological fields, as well as in the applied plant sciences such as horticulture, crop science, plant pathology, resource management and environmental biology.

OPPORTUNITIES

The undergraduate degree is an excellent pre-professional degree in the plant sciences. Many majors continue with graduate studies; see list of graduate degrees. After obtaining a graduate degree, the undergraduate major will be qualified for teaching positions in community and junior colleges, colleges and universities, for research positions in federal and state government laboratories and in private industry. Research technician positions in many life science areas in governmental and industrial laboratories are also career possibilities. The field of biotechnology provides additional technical opportunities. Field botanists and naturalists find employment in state and national park systems and nature interpretation programs.

CURRICULUM

The Bachelor of Science degree with a major in botany is offered under the science curriculum of the College of Agriculture and Life Sciences. See the freshman year program listed. See also other basic requirements listed. The Bachelor of Science degree with double concentration--one in economics, English, history, philosophy or political science, and the other in botany--is available in the College of Humanities and Social Sciences. For details, refer to the appropriate section under the College of Humanities and Social Sciences.

CURRICULUM IN BOTANY
Degree earned: B.S. in Botany

FRESHMAN YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
ALS 103 Intro. Topics in ALS	1	BO 102 Introduction to Research	1
BO 101 Orientation to Botany	1	BAE 121 Computer Applications in ALS or	
BIO 181 Introduction to Biology I	4	CSC 200 Intro. to Comp. & Use[3]	3
ENG 111 Comp. and Rhetoric	3	BIO 183 Introduction to Biology II	4
Humanities/Social Science. Elective[1]	3	ENG 112 Comp. and Reading	3
Restricted Elective[2]	3	MA 131 Analytic Geom. & Calculus A	3
Any 100-level PE in Fitness & Wellness[4]	1		14
	16		

SOPHOMORE YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
CH 101 Chemistry – A Molecular Science	3	CH 201Chemistry – A Quantitative Science	3
CH 102 General Chemistry Lab	1	CH 202 Quantitative Chemistry Lab	1
BO 250 Plant Biology[5]	4	ST 311 Intro. to Statistics	3
English, Modern Language[6], or Comm.	3	BO Restricted Course	4
Humanities/Social Science. Elective[1]	3	Restricted Elecive[2]	3
Restricted Elective[2]	3	Free Elective	1
	17		15

JUNIOR YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
CH 220 Intro. Organic Chemistry or		PY 212 College Physics II	4
CH 221 Organic Chemistry I	4	BO Restricted Course[5]	4
ENG 333 Comm. for Science & Research	3	Restricted Elective[2]	3
PY 211 College Physics I	4	Free Elective[8]	3
Restricted Course[7]	4	Free Elective[8]	3
Free Elective	1		17
	16		

SENIOR YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
GN 411 Prin. of Genetics	4	BO 495 Special Topics in Botany	2
GN 412 Elementary Genetics Lab	1	BO Restricted Course[5]	3
BO Restricted Course[5]	3	Restricted Course[7]	3
BO Restricted Course[5]	4	Free Elective[8]	3
Restricted Elective[2]	4	Free Elective[8]	5
	16		16

Minimum Hours Required for Graduation: 128

[1]At least one course must focus on a non-English speaking culture.
[2]Must include one course from HI 321, HI 322, or HI 481; one additional course or equiv. in study of history &/or literature (see GER list); two courses or equivalent from different content areas in study of psychology, economics, politics & government, sociology, anthropology, & cultural geography (see appropriate list), it is recommended that PHI 340 be taken here or as a free elective; one course from Science, Technology, & Society (Humanities/Social Science Perspective) List.
[3]BAE 121 (focus on IBM compatible systems), CSC 200 (focus on Macintosh systems).
[4]All Physical Education may be taken as credit only. Two (2) hours of PE may be used as free electives.
[5]Must select 18 hrs from BO 360/365, 400, 403, 413, 421, 414, or 480. A 2.000 GPA is required in all Botany courses.
[6]Foreign language proficiency at the FL_ 102 level required for graduation.
[7]Select 12 hours from MB 351, ZO 201, SSC 200 or MEA 101/110, BCH 451/452, CH 223, PP 315, CH 315, ENT 425.
[8]Any course fulfills this requirement; 500 level courses may be taken with permission of the instructor (Graduate credit may be obtained if student qualifies with GPA =/or 3.200 and course is not part of requirements to fulfill the B.S. degree).

DEPARTMENT OF CROP SCIENCE

Williams Hall, Room 2205
Phone: (919) 515-2647

H.T. Stalker, *Interim Head*
J. F. Spears, *Department Extension Leader*
R. P. Patterson, *Undergraduate Coordinator*
R. C. Rufty, *Director of Graduate Programs*

Distinguished University Professor: M. M. Goodman; *Alumni Distinguished Undergraduate Professor:* R. P. Patterson; *William Neal Reynolds Professors:* M. M. Goodman, E. A. Wernsman; *Philip Morris Professor:* G. F. Peedin; *Professors:* J. R. Anderson, D. T. Bowman, A. H. Bruneau, J. C. Burns (USDA), J. W. Burton (USDA), B. E. Caldwell, T E. Carter Jr. (USDA), H. D. Coble, F. T. Corbin, E. J. Dunphy, E. L. Fiscus (USDA), D. S. Fisher (USDA), J. T. Green Jr., S. C. Huber (USDA), R. E. Jarrett, D. A. Knauft, H. M. Linker, R. C. Long, J. E. Miller (USDA), J. P. Mueller, J. P. Murphy, C. H. Peacock, R. C. Rufty, W. D. Smith, H. T. Stalker, J. B. Weber, W. W. Weeks, G. G. Wilkerson, R. F. Wilson (USDA), J. C. Wynne, A. C. York; *Adjunct Professors:* J. R. Evans, K. D. Getsinger, D. G. Oblinger, D. T. Patterson, J. A. Ryals, G. M. Werner, *Professors Emeriti:* R. R. Bennett, C. T. Blake, C. A. Brim, D. S. Chamblee, J. F. Chaplin, W. K. Collins, W. A. Cope, S. H. Dobson, D. A. Emery, W. T. Fike, D. U. Gerstel, W. B. Gilbert, W. C. Gregory, H. D. Gross, G. R. Gwynn, P. H. Harvey, S. N. Hawks, G. L. Jones, G. C. Klingman, J. A. Lee, W. H. Lewis, R. L. Lovvorn, R. P. Moore, D. E. Moreland, A. Perry, L. L. Phillips, J. C. Rice, H. Seltman, G. A. Sullivan, D. L. Thompson, D. H. Timothy, J. A. Weybrew, A. D. Worsham; *Associate Professors:* D. C. Bowman, K. O. Burkey (USDA), D. A. Danehower, R. E. Dewey, T. G. Isleib, S. H. Kay, R. D. Keys, P. Kwanyuen (USDA), D. P. Livingston (USDA), P. H. Sisco (USDA), V. A. Sisson, J. F. Spears, A. K. Weissinger, R. Wells, J. Wilcot; *Associate Professors Emeriti:* R. L. Davis, W. G. Toomey; *Assistant Professors:* K. L. Edmisten, G. P. Fenner, R. W. Heiniger, D. Jordan, J. M. Luginbuhl, R. Qu, P. R. Weisz; *Adjunct Assistant Professor:* M. Fraser; *Extension Specialists:* D. W. Daniel, C. M. Sasscer; *Crop Science Specialists:* S. C. Bennett, C. E. Collins, G. E. Martin; *Associate Members of Faculty:* C. W. Stuber (Genetics), W. F. Thomson, C. T. Young (Food Science); *Visiting Professor:* T. W. Rufty Jr..

Crop Scientists seek to improve the productivity, profitability, and quality of our major food, feed, fiber, and specialty crops; enhance the quality of turf and vegetative cover, enhance our environment, and improve the nutrition and economic health of our world. The Crop Science four-year undergraduate program is offered within the Agronomy curriculum and is administered jointly by the Crop Science and Soil Science Departments. Students may earn a Bachelor of Science degree in the technology curriculum with a major in Agronomy.

OPPORTUNITIES

Agronomy major graduates find employment as consultants, extension agents, farm managers, golf course superintendents, landscape specialists, research scientists, seed production specialists, sod production specialists, soil survey specialists, soil conservationists, technical sales representatives, and waste management specialists. Graduate work can lead to careers in plant breeding, biotechnology, crop physiology and chemistry, and crop management systems. The Agronomy Curriculum can also be found in this catalog under College of Agriculture and Life Sciences. (For Crop Science graduate programs, see the *Graduate Catalog.*)

CURRICULA

Students may earn a Bachelor of Science degree in the technology curriculum with a major in Agronomy. The Agronomy option is administered jointly by the Departments of Crop Science and Soil Science.

MINOR IN CROP SCIENCE

Open to any undergraduate degree student interested in gaining knowledge of the development, productivity and sustainability of crop management systems, genetic improvement and pest management strategies, and interaction of crops with their physical and biotic environment.It is intended to complement other curricula that are related to crop-environment and agroecological studies. An appreciation of agronomic approaches which lead to a more efficient use of crop production inputs and to a less invasive impact on the environment, is emphasized. It is not intended to prepare students for a professional career in Crop Science, and additional courses are recommended for students who plan graduate work in this discipline.

CURRICULUM IN DAIRY SCIENCE

(See Animal Science)

DEPARTMENT OF ENTOMOLOGY

www.cals.ncsu.edu/entomology/

Gardner Hall, Room 2301
Phone: (919) 515-2746

J. D. Harper, *Head*
J. R. Meyer, *Undergraduate Coordinator*
W. M. Brooks, *Director of Graduate Programs*
P. S. Southern, *Department Extension Leader*

Teaching, Research and Extension Faculty
Philip Morris Professor: J.W. Van Duyn; *William Neal Reynolds Professors:* F.L. Gould, G.G. Kennedy; *Blanton J. Whitmire Professor:* C. Schal; *Professors:* J.T. Ambrose, C.S. Apperson, J.S. Bacheler, J.R. Baker, J.R. Bradley Jr., R.L. Brandenburg, W.M. Brooks, L.L. Deitz, F.P. Hain, J.D. Harper, R. J. Kuhr, J.R. Meyer, B.M. Parker, R.M. Roe, K.A. Sorensen, P.S. Southern, R.E. Stinner, J.F. Walgenbach; *Adjunct Professors:* D.M. Jackson, P.M. Marsh, D.E. Sonenshine; *Professors Emeriti:* R.C. Axtell, W.V. Campbell, M.H. Farrier, K.L. Knight, H.B. Moore, Jr., H.H. Neunzig, R.L. Rabb, R.L. Robertson, C.F. Smith, C.G. Wright; *Associate Professors:* M.E. Barbercheck; *Adjunct Associate Professors:* D.A. Herbert, C. Nalepa; *Associate Professor Emeritus:* R.C. Hillmann; *Assistant Professors:* D.B. Orr, C.E. Sorenson, E.L. Vargo, D.W. Watson, B.M. Wiegmann; *Adjunct Assistant Professors:* D.M. Thompson, M.D. Tomalski; *Visiting Assistant Professors:* D.W. Keever, M.G. Waldvogel; *Extension Specialists:* S.B. Bambara, D.L. Stephan, S.M. Stringham, S.J. Toth, Jr., M.G. Waldvogel; *Associate Members of the Department: Professors:* R.B. Leidy (Toxicology), H.M. Linker (Crop Science); *Assistant Professors:* W.G. Buhler (Horticulture), D.J. Robison (Forestry), R. Rose (Toxicology).

Undergraduate instruction in entomology provides introductory and advanced courses in the basic science of entomology and the management of beneficial and pest insects. 200- and 400-level courses fulfill General Education Requirements in Natural Sciences or Science and Technology and serve students majoring in biological sciences, agronomy, botany, horticultural science, agricultural education, crop science, and forestry. They also provide fundamental training for graduate study in entomology (see the *Graduate Catalog*).

OPPORTUNITIES
For graduates with advanced degrees in entomology, opportunities include research, teaching, and extension positions in colleges and universities; research, development, production, control, and sales positions in private industries; consultative positions in pest management; curatorial positions in museums; and research and regulatory positions with state and federal agencies.

MINOR IN ENTOMOLOGY
The Department of Entomology offers an undergraduate minor available to all baccalaureate degree students at North Carolina State University. The minor is especially appropriate for (but not limited to) students interested in biological or agricultural sciences, veterinary medicine, or other health sciences. A basic knowledge of insect biology may also be useful to students seeking careers in government, industry, or education. The minor consists of a minimum of 15 credit hours, including one core course (ENT 425). The remaining 12 hours be selected from a group of restricted electives.

CURRICULA IN ENVIRONMENTAL SCIENCES

(Also see Interdisciplinary Programs or Physical Mathematical Sciences)
Nelson Hall, Room 233E, Williams Hall, Room 2321, and North Gardner Hall, Room 3216

A. W. Oltmans, *Coordinator,* Economic Policy Concentration, Nelson Hall, Room 233E
H. J. Kleiss, *Coordinator,* Environmental Soil Science Concentration, Williams Hall, Room 2321
S. C. Mozley, *Coordinator,* Ecology Concentration, Gardner Hall, Room 2104

Environmental sciences in the broadest sense are concerned with the development of basic knowledge about the world's environments and the use of this knowledge to create new and more efficient ways to maintain or enhance the environment for society's benefit. Given the complexity of environmental processes and the many ways in which humans interact with natural environments, a multidisciplinary systems approach is essential for understanding changes in natural environments. Society's future prospects maintaining and improving our environment depends on advances in economics, other social science and humanities and the use of these advances to develop and maintain effective economic, political and social structures.

Public concern about environmental issues and the resource costs for protecting our environment are increasing. Protecting and improving our environment involves knowledge and systematic problem-solving skills will be essential for environmental scientists. Ecologists and other environmental scientists must be conversant with economics, other social sciences, and humanities, while environmental economists and political scientists must be conversant with physical and biological sciences. The explosive growth of knowledge requires that all environmental scientists be competent in the use of mathematical models and statistics. North Carolina State University's environmental science degree program provides sound training in each of these areas. Successful completion of this diverse and challenging program requires a sound academic background and hard work.

To accommodate the complexity and breadth of environmental sciences, the Bachelor of Science degree in environmental science is a campus-wide program involving two colleges and five departments that administer six concentrations. A common core of 89 hours provides a balanced foundation in communication, humanities social sciences, mathematics and the natural sciences. The core requirements include a freshman introductory environmental science course and a capstone course for seniors in which teams of students from the various concentrations work together on environmental problems from ecological, physical and economic perspectives.

Three departments within the College of Agriculture and Life Sciences offer environmental sciences concentration that allow students to specialize in areas within environmental science: Ecology, Economics Policy and Environmental Soil Science. For information on other concentrations, see Marine, Earth and Atmospheric Sciences and Statistics.

CURRICULUM IN ENVIRONMENTAL SCIENCES, ECONOMIC POLICY CONCENTRATION

Degree earned: B.S. in Environmental Sciences

FRESHMAN YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
BIO 125 General Biology	4	CFR 134 Computers in Natural Resources	1
E 115 Intro. to Computing Environment	1	CSC 112 Intro. to Computing – FORTRAN *or*	
ENG 111 Comp. & Rhetoric	3	CSC 114 Intro. to Computing – C++	3
MA 141 Analytic Geom. & Calculus I	4	ENG 112 Comp. & Reading	3
Social Science Elective[2,3]	3	ES 100 Intro. to Environ. Sci[4]	3
	15	MA 241 Analytic Geom. & Calculus II	4
		Any 100-level in PE in Fitness & Wellness[1]	1
			15

SOPHOMORE YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
ARE 201 Intro. Agric. & Res. Economics *or*		ARE (EC) 336 Intro. Res. & Environ. Economics	3
EC 201 Intro. to Economics I	3	CH 201 Chemistry – A Quantitative Science *and*	3
CH 101 Chemistry – A Molecular Science *and*	3	CH 202 Chemistry Lab	1
CH 102 Chemistry Lab	1	ST 302 Statistical Methods II	3
MA 242 Analytic Geom. & Calculus III	4	Communication Elective[5]	3
ST 301 Statistical Methods I	3	History or Literature Elective[3]	3
Physical Education Elective[1]	1		16
	15		

JUNIOR YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
ARE (EC) 301 Intermediate Microeconomics	3	ENG 331 Comm. for Engr. & Technology *ar*	
BO 200 Plant Life *or*		ENG 332 Comm. for Bus. & Mgmt *or*	
ZO 150 Intro. to Animal Kingdom	4	ENG 333 Comm. for Science & Research	3
PY 205 Physics for Engr. & Science I	4	PY 208 Physics for Engr. & ScienceII	4
ST 430 Intro. to Regression Analysis	3	ST 431 Intro. to Exper. Design *or*	
Histroy or Literature Elective	3	ST 432 Intro. to Survey Sampling	3
	17	Natural Sciences Elective[6]	4
			14

SENIOR YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
ARE (EC) 436 Environ. Economics	3	EC 302 Intermediate Macroeconomics	3
EC 410 Public Finance	3	EC 400 Environ. Sciences Project Course[4]	3
PS 320 U. S. Environ. Law & Politics or		ST 445 Stat. Computing & Data Mgmt.	3
PS 336 Global Environ. Politics	3	Restricted Elective[7]	3
Natural Sciences Elective[6]	4		**12**
Phil., Relig., Vis/Perf. Arts Elective[3]	3		
	16		

Minimum Hours Required for Graduation: 120

Note: a minimum grade of C in English 111 and ENG 112, a grade point average of 2.0 in all ACC, BUS, EC and ECG courses attempted, and foreign language proficiency at the FL_102 level are required to be eligible for graduation. ARE(EC) 336 fulfills the requirement for a Science, Technology and Society (Humanities and Social Science Perspective) elective.

[1]Four credit hours of PE (including any 100-level PE) are required for graduation.

[2]Select from Psychology, Politics & Government, Sociology, Anthropology, and Cultural Geography Electives lists.

[3]One of these courses must focus on a non-English speaking culture.

[4]New courses to be implemented.

[5]Select from COM 110, COM 112, COM 146 or COM 211.

[6]Select two of the following four courses and their co-requisite laboratories: BO 360/BO365; MEA 101; MEA 130/MEA 135; MEA 200/MEA 210.

[7]Select from ARE 433, EC 435, ECG 515, ECG 533, ECG 540, or ECG 551.

CURRICULUM IN ENVIRONMENTAL SCIENCES, SOIL SCIENCE CONCENTRATION
Degree earned: B.S. in Environmental Sciences

FRESHMAN YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
BIO 125 General Biology	4	ALS 103 Intro. Topics in ALS	1
E 115 Intro. to Computing Environment	1	CH 101 Chemistry – A Molecular Science	3
ENG 111 Comp. & Rhetoric[1]	3	CH 102 General Chemistry Lab	1
MA 141 Analytic Geom. & Calculus I	4	ENG 112 Comp. & Reading[1]	3
MEA 101 Geology I: Physical	3	ES 100 Intro. to Environ. Science	3
MEA 110 Geology I Lab	1	MA 241 Analytic Geom. & Calculus II	4
Any 100-level in PE in Fitness & Wellness[2]	1	Physical Education Elective[2]	1
	17		**16**

SOPHOMORE YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
ARE 201 Intro. Agric. & Res. Economics *or*		SSC 341 Intro. to Statistics	3
EC 201 Intro. to Economics I	3	PY 205 Physics for Engr. and Science I	4
BO 200 Plant Life	4	SSC 200 Soil Science	4
CH 201 Chemistry – A Quantitative Science	3	History/ Literature Elective[3]	3
CH 202 Quantitative Chemistry Lab	1	Physical Education Elective[2]	1
MA 242 Analytic Geom. & Calculus III	4		**15**
Physical Education Elective[2]	1		
	16		

JUNIOR YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
BO 360 Intro. to Ecology	3	ENG 331 Comm. for Engr. & Technology *or*	
BO 365 Ecology Lab	1	ENG 333 Comm. for Science & Research	3
MEA 585 Hydrogeology *or*		FOR 353 Air Photo Interp. & Photogram. *or*	
Advised Elective	3	NR 300 Natural Resource Measurement *or*	
PY 208 Physics for Engr. & Science II	4	MEA Intro. to Geologic Materials	3-4
Comm./Speech Elective[4]	3	MB 351 Microbiology	4
	14	SSC 361 Role of Soils in Environ. Mgmt.	3
		SSC 452 Soil Classification	4
			17-18

SENIOR YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
ARE (EC) 336 Env. Economics	3	BAE 471 Land Res. Env. Engr. *or*	
BAE (SSC) 323 Water Mgmt *or*		SSC 562 Env. Applications of Soil Science	3
FOR 401 Watershed and Welands Hydrology	3-4	ES 400 Environ. Sciences Project[4] *or*	
BAE (CE) 578 Agricultural Waste Mgmt. *or*		MEA 400 Earth Systems Modeling *or*	
CH 220 Intro. Organic Chemistry *or*		NR 400 Natural Resource Management	4
FOR (MDS) 584 Pract. of Envi. Impact Assess.	3-4	PS 320 U.S. Environ. Politics *or*	
SSC 461 Soil Physical Properties & Plant Grth.	3	PS 336 Global Environ. Politics	3
History/Literature Elective[3]	3	Phil., Relig., Vis/Perf. Arts Elective[3]	3
	15-17	Social Science Elective	3
			16
		Minimum Hours Required for Graduation	**127**

[1]Grade of C or better required in ENG 111 and ENG 112.
[2]Two credit hours of PE (including any 100-level Fitness & Wellness) are required for graduation.
[3]The Humanities and Social Sciences Requirements are 21 hours of courses as follows:

A. Two courses from the History and Literature Electives Lists.
B. One course from the Philosophy, Religion, or Visual and Performing Arts Electives Lists.
C. One course from the Psychology, Politics and Government, Sociology, Anthropology, or Cultural Geography Elective Lists.
D. Two courses from any of the above lists or the Humanities and Social Sciences (Additional) Electives List.
E. One course among those elected to fulfill the Humanities and Social Sciences requirements also come from the Science, Technology, and Society (Humanities and Social Science Perspective) elective list. If not taken as a Humanities and Social Sciences Elective, then a course from this list must be taken as a Free Elective.

[4]The Writing and Speaking Elective requirement includes one course from the Advanced Writing Electives List or the Communication/Speech Electives List.
Note: Foreign Language proficiency at the FL_102 level is required for graduation.

PROGRAM IN FISHERIES AND WILDLIFE SCIENCES

Turner House, 110 Brooks Avenue

R. L. Noble, *Undergraduate Coordinator*

The Departments of Zoology and Forestry jointly administer the program in Fisheries and Wildlife Sciences. Undergraduate education emphasizes ecological principles and their application to research problems and natural resource management needs. Majors are well prepared for graduate work and entry-level professional positions.

CURRICULUM IN FISHERIES AND WILDLIFE SCIENCES, CONCENTRATION IN FISHERIES SCIENCE

Degree earned: B.S. in Fisheries and Wildlife Sciences

Note: This is suggested order of courses. As long as prerequisites are observed, and specific semester restrictions are observed (see footnotes), courses may be taken in other semesters.

FRESHMAN YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
ALS 103 Intro. Topics in ALS	1	CH 101 Chemistry - A Molecular Science *and*	3
BIO 125 General Biology *or*		CH 102 General Chemistry Lab	1
ZO 150 Animal Diversity	4	COM 110 Public Speaking	3
MA 131 Calculus for Life & Mgmt. Sci. A	3	ENG 112 Comp. & Reading	3
Humanities/Soc. Sci. Elective[3]	3	ZO 150 Animal Diversity *or*	
ENG 111 Comp. & Rhetoric	3	ZO 160 Cell & Development[3]	4
Any 100-level PE in Fitness & Wellness[1]	1	Physical Education Elective	1
	15		**15**

SOPHOMORE YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
CH 221 Organic Chemistry	4	ARE 201 Intro. Agric. Res. Economics *or*	
FW (FOR_ZO) 221 Conserv. Natural Resources	3	EC 205 Fundamentals of Econ.	3
PY 131 Conceptual Physics *or*		BO 200 Plant Life	4
PY 211 College Physics I	4	ZO 260 Evol., Behav. & Ecol. *or*	4
Humanities/Social Science Elective[2]	3	BO 360 Intro. to Ecology *and*	
	14	BO 365 Ecology Lab	4
		CH 223 Organic Chemistry II	4

JUNIOR YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
Quantitative Science Elective[4]	3	GN 301 Genetics in Human Affairs	3
FW(ZO) 420 Fisheries Science	3	Advised Elective[5]	3
W(ZO) 423 Intro. Fish. Sci. Lab.	3	Humanities/Soc.Sci. Elective[2]	3
PS 201 Intro. to American Govt.	1	Restricted Elective[6]	3
ST 311 Intro. to Statistics.	3	Zoology Elective[7]	3
Advised Elective[5]	3		**15**
	16		

SUMMER TRAINING PROGRAM

FW (FOR) 310 Fisheries & Wildlife Inventory & Mgmt	**6**

SENIOR YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
ENG 333 Comm. for Sci. & Research	3	FW (ZO) 430 Fish. Wildlife Admin.	3
FW (ZO) 353 Wildlife Mgmt.	3	Advised Elective[5]	5
ZO 419 Limnology	4	Humanities/Soc.Sci. Elective[2]	3
Humanities/Soc.Sci. Elective[2]	3	ZO 441 Biology of Fishes	3
Physical Science Elective[8]	4	ZO 442 Biology of Fishes Lab	1
	17		**15**
		Minimum Hours Required for Graduation	**128**

General Note: Foreign Language proficiency at the FL_ 102 level is required for graduation.

[1]Two semesters of physical education (PE) are required for graduation, including one 100-level course in Fitness & Wellness. PE courses can be taken on an s/u basis.

[2]Among the 15 hours of elective Humanities and Social Sciences (HSS), the student must take one history, onditerature, one course in philosophy, religion or visual/performing arts, and two additional courses from any approved HSS lists. One of these five courses must come from the approved list of courses on Non-English Speaking Cultures.

[3]Take ZO 150 if BIO 125 was taken previously; take ZO 160 if ZO 150 was taken previously.

[4]Choose from CSC 200, MA 214 or MA 231

[5]Total of 11 credits of advised electives applicable to academic and career goals are to be chosen in consultation with your advisor. Must be 200 level or higher. See list of approved courses below.

[6]Choose from FW(FOR) 404, FW(FOR) 485, FW(ZO) 515, FW(ZO) 553, FW(ZO) 586 or BO 403.

[7]Choose from ZO 212, ZO 410 or ZO 402 and ZO 403.

[8]Choose from soil science, marine/earth/atmospheric sciences, or from advanced courses in physics, chemistry, mathematics or computer science.

Advised Electives, Fisheries Concentration (SFF)

BAE(SSC) 323 Water Management 3(2-2)F
BO 400 Plant Diversity 4(3-3)F
BO 403 Systematic Botany 4(2-4)S
BO(MB) 574 Phycology 3(1-4)S Alt. yrs
FOR 353 Air Photo Interpretation 3(2-3)F
FOR 401 Forest Hydrology and Watershed Management 4(3-3)F
FOR 472 Renewable Resource Policy and Mgmt. 3(3-0)F
FOR(MDS) 584 Environmental Impact Assessment 4(0-8)F Alt. yrs.
FW(FOR) 404 Forest Wildlife Management 3(3-0)S
FW (FOR)485 Natural Resources Advocacy 3(2-3)S
FW(ZO) 515 Fish Physiology 3(2-3)F Alt. yrs.
FW(ZO) 553 Principles of Wildlife Science 3(2-3)F
FW(ZO) 586 Aquaculture I 3(3-0)F
FW(ZO) 587 Aquaculture I Lab 1(0-3)F Alt. yrs.
MB 351 General Microbiology 4(3-3)F,S
MEA(ZO) 220 Marine Biology 3(3-0)S
MEA(ZO) 520 Principles of Biological Oceanography 3(3-0)S
NTR(ANS,FS) 301 Intro.Modern Nutrition 3(3-0)F,S
NTR(ANS,PO) 415 Comparative Nutrition 3(3-0)F
SSC 200 Soil Science 4(3-3)F,S
ZO 212 Basic Anatomy and Physiology 4(4-0)S
ZO 315 General Parasitology 3(2-3)S
ZO 402 Invertebrate Zoology 2(2-0)S Alt. yrs.
ZO 410 Animal Behavior 3(3-0)F
ZO 460 Aquatic Natural History Lab 2(0-6)S
ZO 593 Aquatic Ecology Seminar 1-3, F,S

*BAE 121Computer Applications in ALS 3(1-4)F,S
*CSC 200 Intro. to Computers 3(2-2)F,S
*For students who fulfilled quantitative requirement with a non-computer course.

CURRICULUM IN FISHERIES AND WILDLIFE SCIENCES, CONCENTRATION IN WILDLIFE SCIENCE
Degree earned: B.S. in Fisheries and Wildlife Sciences

Note: This is a suggested order of courses. As long as prerequisites are observed, and specific semester restrictions are observed (see footnotes), courses may be taken in other semesters.

FRESHMAN YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
ALS 103 Intro. Topics in ALS	1	CH 101 Chemistry - A Molecular Science *and*	
BIO 125 General Biology *or*		CH 102 General Chemistry Lab	4
ZO 150 Animal Diversity	4	COM 110 Public Speaking	3
MA 131 Calculus for Life & Management Science A	3	ENG 112 Composition & Reading	3
Any 100-level PE in Fitness & Wellness[1]	1	ZO 150 Animal Diversity *or*	
Humanities/Social Science Elective[2]	3	ZO 160 Cell & Development[3]	4
ENG 111 Composition & Rhetoric	3	Physical Education Elective	1
	15		**15**

SOPHOMORE YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
CH 221 Organic Chemistry	4	ARE 201 Intro. Agric. Res. Economics *or*	
FW (FOR,ZO) 221 Conserv. Natural Resources	3	EC 205 Fundamentals of Economics	3
PY 131 Conceptual Physics *or*		BO 200 Plant Life	4
PY 211 College Physics I	4	ZO 260 Evol., Behav. & Ecol. *or*	4
Humanities/Social Science Elective[2]	3	BO 360 Intro. to Ecology *and*	
	14	BO 365 Ecology Lab	4
		CH 223 Organic Chemistry II	4
			15

JUNIOR YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
Quantitative Science Elective[4]	3	FW (FOR) 404 Forest Wildlife Mgmt.	3
FW (ZO) 353 Wildlife Mgmt.	3	GN 301 Genetics in Human Affairs	3
PS 201 Intro. to American Govt.	3	Advised Elective[5]	3
ST 311 Intro. to Statistics.	3	Humanities/Social Science Elective[2]	3
Advised Elective[5]	3	Zoology Elective[6]	3
	15		**15**

SUMMER TRAINING PROGRAM

FW (FOR) 310 Fisheries & Wildlife Inventory & Mgmt.	6

SENIOR YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
ENG 333 Comm. for Sci. & Research	3	BO 403 Systematic Botany	4
FW (ZO) 420 Fisheries Science	3	FW (ZO) 430 Fish. Wildlife Admin.	3
Advised Elective[5]	3	Advised Elective[5]	3
Humanities/Soc.Sci. Electives[2]	3	Humanities/Soc.Sci. Elective[2]	3
Restricted Elective[7]	3	Physical Science Elective[8]	4
	15		**17**

Minimum Hours Required for Graduation: 127

General Note: Foreign Language proficiency at the FL_ 102 level is required for graduation.

[1]Two semesters of physical education (PE) are required for graduation, including one 100-level course in Fitness & Wellness. PE courses can be taken on an s/u basis.

[2]Among the 15 hours of elective Humanities and Social Sciences (HSS), you must take one history, one literature, one course in philosophy, religion or visual/performing arts, and two additional courses from any approved HSS lists. One of these five courses must come from the approved list of courses on non-English Speaking Cultures.

[3]Take ZO 150 if BIO 125 was taken previously; take ZO 160 if ZO 150 was taken previously.

[4]Choose from BAE 121, CSC 200, FOR(WPS) 273, MA 214 or MA 231

[5]Total of 12 credits of advised electives applicable to academic and career goals are to be chosen in consultation with your advisor. Must be 200 level or higher. See list of approved courses below.

[6]Choose from ZO 212, ZO 410 or ZO 402 and ZO 403.

[7]Choose from FW(FOR) 485, FW(ZO) 553, ZO 419 or ZO 441.

[8]Choose from soil science, marine/earth/atmospheric sciences, or from advanced courses in physics, chemistry, mathematics or computer science.

FOR 212 Dendrology 4(2-4)F
FOR 252 Forest Science 3(2-3)S
FOR 353 Air Photo Interpretation 3(2-3)F
FOR 472 Renewable Resource Policy and Management 3(3-0)F
FOR 584 Environmental Impact Assessment 4(0-8)F
FW 485 Natural Resources Advocacy 3(2-3)S
FW(ZO) 554 Wildlife Field Studies 3(2-3)S Alt. yrs.
FW(FOR) 594 Seminar in Wildlife Management 1(1-0)S Alt. yrs.
MB 351 General Microbiology 4(3-3)F,S
NTR(ANS,FS) 301 Intro.Modern Nutrition 3(3-0)F,S
PO 410 Production and Mgmt. Game Birds in Confinement 3(2-3)S
PRT 442 Recreation and Park Interpretive Services 3(2-3)F
PS 307 Intro.Criminal Law in the United States 3(3-0)F,S
PS 311 Criminal Justice Policy Process 3(3-0)F,S
SSC 200 Soil Science 4(3-3)F,S
ZO 212 Basic Anatomy and Physiology 4(4-0)S
ZO 303 Vertebrate Zoology 4(3-3)F,S
ZO 402 Invertebrate Zoology 2(2-0)S
ZO 410 Animal Behavior 3(3-0)F
ZO 419 Limnology 4(3-3)F
ZO 441 Biology of Fishes 3(3-0)F
ZO 442 Biology of Fishes Lab 1(0-3)F
ZO 501 Ornithology 3(2-3)S Alt. yrs.
ZO 544 Mammalogy 4(3-3)F

*BAE 121 Computer Application in ALS 3(1-4)F,S
*CSC 200 Intro. to Computers 3(2-2)F,S
*For students who fulfilled quantitative requirement with a non-computer course.

DEPARTMENT OF FOOD SCIENCE

Schaub Hall, Room 100
Phone: (919) 515-2951

K. R. Swartzel, *Head*
D. R. Ward, *Associate Department Head and Department Extension Leader*
P. M. Foegeding, *Undergraduate Teaching Coordinator*
D. K. Larick, *Graduate Administrator*

William Neal Reynolds Professors: T. R. Klaenhammer, H. E. Swaisgood, K. R. Swartzel; *Professors:* D. E. Carroll Jr., G. L. Catignani Jr., H. P. Fleming (USDA), E. A. Foegeding, D. D. Hamann, A. P. Hansen, T. C. Lanier,D.K. Larick, R. F. McFeeters (USDA), J. L. Oblinger, D. H. Pilkington, J. E. Rushing, T. H. Sanders (USDA), B. W. Sheldon, S. J. Schwartz, L. G. Turner, W. M. Walter Jr. (USDA), C. T. Young, *Adjunct Professors:* J. P. Adams, N. B. Webb, *Professors Emerti:* L. W. Aurand, H. R. Ball, T. A. Bell Jr., T. N. Blumer, R.E. Carawan, J. A. Christian, E. S. Cofer, H. B. Craig, M. E. Gregory, M. W. Hoover, I. D. Jones, V. A. Jones, N. C. Miller Jr., A. E. Purcell, W. M. Roberts, M. L. Speck, F. R. Tarver Jr., F. B. Thomas, F. G. Warren; *Associate Professors:* J. C. Allen, L. C. Boyd, P.A. Curtis, D. K. Larick; *Assistant Professors:* B. K. Farkas, D. P. Green, L. Jaykus, *Associate Members of Faculty:* B. K. Garland

The Department of Food Science provides undergraduate and graduate programs for the application and integration of chemistry, biology, and engineering to the development, processing, packaging, quality control, distribution and utilization of safe and nutritious foods. The Food Science B.S. is compatible with pre-professional school curricula; many students elect to double major in Food Science with Biochemistry, Chemical Engineering, Poultry Science or other curricula. Minors in a variety of areas are also encouraged. The department maintains modern, fully-equipped laboratories for teaching and research in the disciplines of food microbiology, food chemistry/biochemistry, food engineering, and nutrition; and the product areas of dairy, fruit, meats, poultry, seafood and vegetable products. Departmental programs address food safety, value-added food processing, environmental impact of food processing, and nutritional health. Food Science includes the most current information related to biotechnology, engineering approaches and computer applications as they relate to providing safe foods with minimal impact on the environment.

OPPORTUNITIES

Increasing consumer concern regarding food safety and demands for greater varieties of nutritious and convenient foods of uniformly high quality create many varied career opportunities in the food and allied industries. Career opportunities in food industries include management, research and development, process supervision, quality control, procurement, distribution, and sales and merchandising. Positions include sales and services in allied industries, consulting and trade association activities, and promotional and educational services. Food Science graduates hold teaching, research and extension positions with colleges and universities. Governmental agencies employ food scientists whose work is directed toward research, regulatory control and the development of food standards.

The food industry provides both merit and financial need scholarships to encourage students preparing for careers in Food Science. Phi Tau Sigma invites outstanding seniors to membership, and all students are encouraged to participate in the Food Science Club, a student branch of the Institute of Food Technologists.

CURRICULA

The Bachelor of Science degree with a major in Food Science is offered through curricula with a science emphasis or a technology emphasis. The science program is designed for students with interest in graduate school or for those desiring more rigorous science courses for technical careers in the food industry. Students more interested in business opportunities for technically trained individuals find the technology program permits greater flexibility in complementing Food Science coursework with business, agricultural commodity and computer science courses.

MINOR IN FOOD SCIENCE

The minor in Food Science is designed to provide important food science principles and concepts to students seeking to improve their understanding of food and food processing and especially to those seeking employment as chemists, microbiologists, engineers, nutritionists, business specialists, or technical writers in the food or pharmaceutical industry. One introductory course (FS 201) is required, and 12 additional hours at the 300 or 400 level may be selected to complement a variety of majors.

SCIENCE CURRICULUM IN FOOD SCIENCE
Degree earned: B.S. in Food Science

FRESHMAN YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
ALS 103 Intro. Topics in ALS	1	CH 101 Chemistry - A Molecular Science	3
BIO 125 General Biology	4	CH 102 General Chemistry Lab	1
ENG 111 Comp. & Rhetoric	3	ENG 112 Comp. & Reading	3
MA 107 Precalculus I	3	FS 201 Food Science & the Consumer	3
Humanities/Social Science. Elective[2]	3	MA 131 Calculus for Life and Mgmt. Science A	3
Any 100-level in PE in Fitness & Wellness[1]	1	Physical Education Elective	1
	15		**14**

SOPHOMORE YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
CH 221 Organic Chemistry I	4	CH 223 Organic Chemistry II	4
FS 290 Preparing for Careers in Food Science	1	FS 231 Food Engineering	4
MA 231 Calculus for Life and Management Science	3	PY 212 College Physics II	4
MA 132 Comp. Math for Life and Mgmt. Science	1	Humanities/Social Science. Elective[2]	3
PY 211 College Physics I	4		**15**
Humanities/Social Science. Elective[2]	3		
	16		

JUNIOR YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
CH 201 - Chemistry - A Quantitative Science	3	BCH 451 Prin. of Biochemistry	4
CH 202 Quantitative Chemistry Lab	1	FS 400 Prin. of Human Nutrition	3
FS 402 Food Chemistry	3	FS 403 Food Analysis	4
ST 311 Intro. to Statistics	3	MB 351 General Microbiology	3
Communication Elective[3]	3	MB 352 General Microbiology Lab	1
Food Science Elective[4]	4	Humanities/Social Science. Elective[2]	3
	16		**18**

SENIOR YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
FS (MB) 405 Food Microbiology	3	FS 475 Prob. & Design in Food Science	3
FS (MB) 406 Food Microbiology Lab	1	Food Science Elective[6]	3
FS 421 Food Preservation	3	Humanities/Social Science. Elective[2]	3
Humanities/Social Science. Electives[2]	6	Free Electives[5]	6
Free Elective	3		**15**
	16		

Minimum Hours Required for Graduation: 126[4]

[1]Two credit hours of PE (including any 100-level Fitness & Wellness course) are required for graduation..
[2]These courses must be selected from the approved GER listing for Humanities and Social Sciences as follows:
6 credits in history and/or literature, **3 credits** from philosophy, religion or visual and performing arts, **6 credits** from two different areas in psychology, economics, politics and government, sociology, anthropology or cultural geography, **3 credits** of science technology and society from a humanities and social science perspective. The final 3 credits may be from any courses in the aforementioned categories. At least **1 course** in the Humanities and Social Sciences must focus on a non-English speaking culture.
[3]Course must be selected from the approved GER Communication Electives List.
[4]Students must have demonstrated foreign language proficiency at the FI 102 level.
[5]Students wishing to apply to the College of Veterinary Medicine at N.C. State should take GN 411 and one course in animal nutrition (ANS 230, ANS 250, FS(ANS,NTR) 301 or NTR (ANS) 415). Students should be aware that some medical schools require vertebrate zoology (ZO303/304) or anatomy (ZO 370/375 and 371/376); genetics and parasitology are recommended.
[6]A total of 35 credits of Food Science are required.

TECHNOLOGY CURRICULUM IN FOOD SCIENCE
Degree earned: B.S. in Food Science

FRESHMAN YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
ENG 111 Comp. & Rhetoric	3	ALS 103 Intro. Topics in ALS	1
MA 107 Precalculus I	3	CH 101 Chemistry - A Molecular Science	3
Communication Elective[1]	3	CH 102 General Chemistry Lab	1
Humanities/Social Science. Elective[2]	3	ENG 112 Comp. & Reading	3
Free Elective[3]	3	MA 114 Intro. to Finite Math. Applic. *or*	
	15	MA 131 Calculus for Life and Mgmt. Science A	3-4
		Any 100-level PE in Fitness & Wellness[4]	1
		Free Elective[3]	3
			15-16

SOPHOMORE YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
CH 220 Intro. Organic Chemistry *or*		BIO 125 General Biology	4
CH 221 Organic Chemistry I	4	CH 201 Chemistry - A Quantitative Science	3
FS 201 Food Science & the Consumer	3	CH 202 Quantitative Chemistry Lab	1
FS 290 Preparing for Careers in Food Science	1	FS 231 Food Engineering	4
MA 121 Elements of Calculus *or*		FS 322 Muscle Foods & Eggs *or*	
MA 231 Calculus for Life and Mgmt. Sciences B	3	FS 324 Milk & Dairy Products	2-3
MA 132 Comp. Math for Life and Mgmt. Science	1		**14-15**
PY 211 College Physics I	**16**		

JUNIOR YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
CH 223 Organic Chemistry *or*		FS 403 Food Analysis	4
Free Elective[3]	3-4	Food Science Elective[5]	3-4
FS 402 Food Chemistry	3	MB 351 General Microbiology	3
Humanities/Social Science Elective[2]	3	MB 352 General Microbiology Lab	1
Restricted Elective[3]	3	Humanities/Social Science Elective[2]	3
Physical Education Elecitve[4]	1	Restricted Elective[3]	3
	13-14		**17-18**

SENIOR YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
FS (MB) 405 Food Microbiology	3	FS 416 Quality Control Food Products	3
FS (MB) 406 Food Microbiology Lab	1	FS 475 Problems and Design in Food Science	3
FS 421 Food Preservation	3	Humanities/Social Science Elective[2]	6
Humanities/Social Science Elective[2]	6	Free Elective[3]	3
Restricted Elective[3]	3		**15**
	16		

Minimum Hours Required for Graduation: 123[6]

[1]Course must be selected from the approved GER Communication Electives List.
[2]These courses must be selected from the approved GER listing for Humanities and Social Sciences as follows:
6 credits in history and/or literature, **3 credits** from philosophy, religion or visual and performing arts, **6 credits** from two different areas in psychology, economics, politics and government, sociology, anthropology or cultural geography, **3 credits** of science technology and society from a humanities and social science perspective. The final three credits may be from any courses in the aforementioned categories. At least **1 course** in the Humanities and Social Sciences must focus on a non-English speaking culture.
[3]Nine credits of Business or Economics must be included or the student must complete a minor in any field of their choosing. If the Business/Economics option is elected, EC 201 or ARE 201 is required. Six additional credits of Business and Economics electives should be selected from the following: ARE 306, ARE 311, ARE 312, ARE 423, ARE 433, BUS 305, BUS 307, BUS 308, BUS 320, BUS 330, BUS 332, BUS 346, BUS 360, BUS 420, BUS 462, BUS 464, BUS 465, EC 202, EC(ARE) 301, EC 302, EC(BUS) 310, EC(ARE) 336, EC(ARE) 401, EC(BUS) 404, EC 431, EC(ARE) 436, EC 448, EC(BUS) 449. If a minor is chosen, restricted electives and free electives may be used to fulfill the minor requirements. Most minors require 15 to 21 credits.
[4]Two credit hours of PE (including any 100-level Fitness & Wellness course) are required for graduation.
[5]A total of 33 credits of Food Science are required.
[6]Students must have demonstrated foreign language proficiency at the FI 102 level.

DEPARTMENT OF GENETICS

www.cals.ncsu.edu/genetics/

Gardner Hall, Room 3513
Phone: (919) 515-2292

S. E. Curtis, *Head and Director of Graduate Programs*
W. H. McKenzie, *Undergraduate Teaching Coordinator and Undergraduate Minor Administrator*

Alumni Distinguished Undergraduate Professor: T.H. Emigh, W.H. McKenzie; *William Neal Reynolds Professors:* W.R. Atchley, T.F.C. Mackay; *Distinguished University Professor:* J.G. Scandalios; *Professors:* S.E. Curtis, W.E. Kloos, H.E. Schaffer, S.L. Spiker; *Adjunct Professor:* M.D. Chilton; *Professors Emeriti:* C.H. Bostian, W.D. Hanson, C.S. Levings, T.J. Mann, D.F. Matzinger, R.H. Moll, C.W. Stuber, A.C. Triantaphyllou; *Associate Professors:* M.T. Andrews, M.A. Conkling, J.W. Mahaffey; *Assistant Professors:* E.S. Buckler (USDA), G.C. Gibson, J.C. Swaffield, M.D. Purugganan; *Associate Members of the Faculty:* E.J. Eisen, B.T. McDaniel, O.W. Robison (Animal Science); L. Hanley-Bowdoin (Biochemistry); R.S. Boston, W.F. Thompson (Botany); E.A. Wernsman (Crop Science); M.M. Goodman (Crop Science, Statistics, Botany); R.R. Sederoff (Forestry; Biochemistry); S.A. Lommel, C.H. Opperman (Plant Pathology); B.S. Weir, J.L. Thorne, S.B. Zeng (Statistics).

The Department of Genetics offers courses at the advanced undergraduate and graduate levels. Undergraduate students interested in genetics are encouraged to pursue a genetics minor (see below) in conjunction with a major in one of the basic biological or agricultural sciences. An undergraduate major in genetics is not available. The graduate program is designed to train scientists for research and teaching careers in genetics and molecular biology. Please refer to the *Graduate Catalog* for further information concerning the M.S. and Ph.D. degrees in genetics and the Master of Genetics degree.

MINOR IN GENETICS

The Department of Genetics offers an undergraduate minor in genetics to provide students with strong preparation in the principles of genetics as well as preparation in ancillary fields such as statistics, biochemistry and microbiology. This minor is appropriate for (but not limited to) students with majors in agronomy, animal science, biochemistry, biological sciences, botany, crop science, environmental sciences, fisheries and wildlife sciences, food science,

forestry, horticultural science, medical technology, microbiology, poultry science, and zoology. The genetics minor requires 18 credit hours - 15 specified and 3 elective. A grade of C or better is required for all courses to fulfill the genetics minor requirements.

DEPARTMENT HORTICULTURAL SCIENCE

Kilgore Hall, Room 114
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T.J. Monaco, *Head*
B.H. Lane, *Undergraduate Coordinator* e-mail: Bryce_Lane@ncsu.edu
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Alumni Distinguished Undergraduate Professor: B.H. Lane; *Alumni Distinguished Graduate Professor:* D.M. Pharr; *Professors:* D.A. Bailey, J.R. Ballington Jr., T.E. Bilderback, S.M. Blankenship, F.A. Blazich, A.A. De Hertogh, P.R. Fantz, W.C. Fonteno, R.G. Gardner, L.E. Hinesley, W.E. Hooker, R.E. Lyons, T.J. Monaco, D.W. Monks, P.V. Nelson, M.M. Peet, K.B. Perry, D.M. Pharr, E.B. Poling, M.A. Powell Jr., D.C. Sanders, C.R. Unrath, S.L. Warren, T.C. Wehner, D.J. Werner, L.G. Wilson, E. Young; *Adjunct Professors:* W.W. Collins, R.L. Sawyer, P.S. Zoner; *Professors Emeriti:* W.E. Ballinger, A.A. Banadyga, J.F. Brooks Jr., F.D. Cochran, H.M. Covington, J.H. Harris, F.L. Haynes Jr., W.R. Henderson, G.R. Hughes, J.M. Jenkins, T.R. Konsler, R.A. Larson, J.W. Love, C.M. Mainland, C.H. Miller, D.T. Pope, W.A. Skroch, J.H. Wilson, Jr.; *Associate Professors:* J.D. Burton, S.D. Clouse, J.M. Davis, J.C. Neal, M.L. Parker, T.G. Ranney, J.R. Schultheis; *Adjunct Associate Professor:* F.C. Wise (Westvaco Corp.); *Associate Professor Emeritus:* T.F. Cannon; *Assistant Professors:* N.G. Creamer, G.E. Fernandez, A.R. Okigbo, B.E. Whipker, G.C. Yencho; *Research Assistant Professor:* J.D. Williamson; *Adjunct Assistant Professor:* C.E. Niedziela; *Lecturer:* B.H. Lane, M.E. Traer; *Researcher:* J.A. Huber, K.V. Pecota, S.D. Rooks; *Extension Specialists:* L. Bass, R.E. Bir; *Extension Associates:* K.R. Baldwin, E.B. Dish, E.D. Evans, W.E. Mitchem; *Associate Members of the Faculty:* D.E. Carroll Jr. (Food Science), G.E. Hoyt (Soil Science), R.J. Volk (Soil Science), F.H. Yelverton (Crop Science).

Horticulture is a dynamic segment of agriculture. The development, growth, distribution, and utilization of fruits, vegetables, flowers and ornamental plants plus the arts of floral design and landscaping enrich our lives with nutritious foods and more attractive surroundings. North Carolina's varied climatic conditions favor the production of a wide variety of horticultural crops on a commercial scale, as well as the development of parks and gardens. The population and amount of industry in the state are increasing, and with them the use of ornamental plants. Designers skilled in residential and commercial landscaping, interior plantscaping, and plant maintenance are in high demand. All this in turn has created a growth in interest in horticulture education.

Undergraduate programs in horticultural science offer a broad based education in physical and biological sciences and a sound cultural background. Students can concentrate in areas of fruit and vegetable science, floriculture, woody ornamental plant science, landscape horticulture, or pursue a general approach which encompasses all the specialties. They are prepared for graduate study or for diverse professional service.

OPPORTUNITIES

Horticulture graduates fill positions in production, processing, sales and service. Among these are county extension agents; vocational agricultural teachers; landscapers and landscape contractors; farm operators; orchard, nursery, greenhouse and garden center managers; research, production and promotional specialists with commercial seed, floral, fertilizer, chemical and food companies; inspectors and quality control technologists; USDA specialists and leaders in other phases of agricultural and industrial developments. The student may also prepare for a career in research, teaching, or extension in horticulture.

CURRICULA

The degree of Bachelor of Science with a major in horticultural science can be earned in either science or technology. Under the science curriculum, specialized education is offered in fruit and vegetable crops, floriculture, and ornamental horticulture. Under the technology curriculum, education is offered in landscape horticulture or in a general approach which includes all the commodity areas.

MINOR IN HORTICULTURAL SCIENCE

The academic minor in Horticultural Science is offered to students who desire a strong foundation in the principles of horticultural science. Students may choose to enhance their own major by selecting courses in a specialized area of horticulture such as fruits and vegetables, ornamentals, floriculture, or landscape horticulture, or they may pursue a more general approach to the entire field of study. Sixteen or seventeen credit hours are required for the minor, depending on courses selected.

SCIENCE CURRICULUM IN HORTICULTURAL SCIENCE, FLORICULTURE CONCENTRATION

Degree earned: B.S. in Horticultural Science

FRESHMAN YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
ALS 103 Intro. Topics in ALS	1	CH 101 Chemistry – A Molecular Science	3
BIO 125 General Biology	4	CH 102 General Chemistry Lab	1
ENG 111 Comp. & Rhetoric	3	ENG 112 Comp. & Reading	3
MA 107 Precalculus I	3	HS 201 Principles of Horticulture	3
PE 10X[1] Health & Physical Fitness[2]	1	MA 121 Elements of Calculus or	
Humanities/Social Science. Elective[3]	3	MA 131 Analytic Geom. & Calculus A	4
	15	Physical Education Elective[2]	1
			15

SOPHOMORE YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
BO 200 Plant Life	4	CH 221 Organic Chemistry I	4
CH 201 Chemistry – A Quantitative Science	3	HS 212 Ornamental Plants II	3
CH 202 Quantitative Chemistry Lab	1	SSC 200 Soil Science	4
HS 290 Perspectives in Horticultural Science	1	PY 212 College Physics II	4
PY 211 College Physics I	4	Physical Education Elective[2]	1
Free Elective	3		**16**
Physical Education Elective[2]	1		
	17		

JUNIOR YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
CH 223 Organic Chemistry II	4	BO 421 Plant Physiology	4
ENT 425 General Entomology	3	PP 315 Prin. of Plant Pathology or	
HS 301 Plant Propagation	4	PP 318 Forest Pathology[5]	4
HS 440 Greenhouse Mgmt.	3	Humanities/Social Science. Elective[3]	3
Humanities/Social Science. Elective[3]	3	Writing/Speaking Elective[4]	3
	17	Free Elective	3
			17

SENIOR YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
GN 411 Prin. of Genetics	4	BCH 451 Prin. of Biochemistry	4
GN 412 Elementary Genetics Lab	1	HS 442 Floriculture II	3
HS 441 Floriculture I	3	Humanities/Social Science. Elective[3]	6
Humanities/Social Science. Elective[3]	6	Free Elective	3
Free Elective	2		**16**
	16		

Minimum Hours Required for Graduation: 128[6]

[1]Students may choose from PE 101-107.
[2]Four semester hours of physical education (PE) are required for graduation; the first two hours of PE taken may be counted for free elective. If a student chooses not to count these first two hours as free elective, these hours will not count toward graduation and two additional hours of free elective must be completed.
[3]The Humanities and Social Sciences Requirements are 21 hours of courses as follows:
A. One course from History Electives List and one course from Literature Electives List.
B. One course from Philosophy Electives, Religion Electives, and Visual and Performing Arts Electives List.
C. One course from the Economics Elective List and one course from the following Elective Lists: Psychology, Politics and Government, Sociology, Anthropology, and Cultural Geography.
D. Two courses from any of the above lists or the Humanities and Social Sciences (Additional) List.
E. One of the courses among those elected to fulfill the Humanities and Social Sciences Requirements must focus on a non-English speaking culture.
F. It is suggested that one of the courses elected to fulfill the Humanities and Social Sciences Requirements also come from the Science, Technology, and Society (Humanities and Social Science Perspective) List. If not taken as a Humanities and Social Sciences Elective, then a course from this List must be taken as a Free Elective.
[4]The Writing and Speaking Elective Requirement includes one course from the Advanced Writing Electives List or the Commun./Speech Electives List.
[5]PP 315 and PP 318 offered Fall and Spring semester, respectively. Only one course required. [6]Language proficiency at FL_102 level is required for graduation.

SCIENCE CURRICULUM IN HORTICULTURAL SCIENCE, FRUITS AND VEGETABLE CONCENTRATION
Degree earned: B.S. in Horticultural Science

FRESHMAN YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
ALS 103 Intro. Topics in ALS	1	CH 101 Chemistry – A Molecular Science	3
BIO 125 General Biology	1	CH 102 General Chemistry Lab	1
ENG 111 Comp. & Rhetoric	3	ENG 112 Composition & Reading	3
MA 107 Precalculus I	3	HS 201 Principles of Horticulture	3
PE 10X[1] Health & Physical Fitness[2]	1	MA 121 Elements of Calculus *or*	
Humanities/Social Science. Elective[3]	3	MA 131 Analytic Geom. & Calculus A	3
	15	Physical Education Elective[2]	1
			14

SOPHOMORE YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
BO 200 Plant Life	4	CH 221 Organic Chemistry I	4
CH 201 Chemistry – A Quantitative Science	3	PY 212 College Physics II	4
CH 202 Quantitative Chemistry Lab	1	SSC 200 Soil Science	4
HS 290 Perspectives in Horticultural Science	1	Humanities/Social Science. Elective[3]	3
PY 211 College Physics I	4	Physical Education Elective[2]	1
Free Elective	3		**16**
Physical Education Elective[2]	1		
	17		

JUNIOR YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
CH 223 Organic Chemistry II	4	BO 421 Plant Physiology	4
ENT 425 General Entomology	3	PP 315 Prin. of Plant Pathology *or*	
HS 431 Vegetable Production	4	PP 318 Forest Pathology[5]	4
Humanities/Social Science. Elective[3]	3	Humanities/Social Science. Elective[3]	3
Free Elective	3	Writing/Speaking Elective[4]	3
	17	Free Elective	3
			17

SENIOR YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
GN 411 Prin. of Genetics	4	BCH 451 Prin. of Biochemistry	4
GN 412 Elementary Genetics Lab	1	HS 422 Small Fruit Production	3
HS 421 Physiology of Tree Fruits	3	HS 462 Postharvest Physiology	3
Departmental Elective[5]	3	Humanities/Social Science. Elective[3]	3
Humanities/Social Science. Elective[3]	6	Free Elective	2
	17		**15**

Minimum Hours Required for Graduation: 128[7]

[1]Students may choose from PE 101-107.
[2]Four semester hours of physical education (PE) are required for graduation; the first two hours of PE taken may be counted for free elective. If a student chooses not to count these first two hours as free elective, these hours will not count toward graduation and two additional hours of free elective must be completed.
[3]The Humanities and Social Sciences Requirements are 21 hours of courses as follows:
A. One course from History Electives List and one course from Literature Electives List.
B. One course from Philosophy Electives, Religion Electives, and Visual and Performing Arts Electives List.
C. One course from the Economics Elective List and one course from the following Elective Lists: Psychology, Politics and Government, Sociology, Anthropology, and Cultural Geography.
D. Two courses from any of the above lists or the Humanities and Social Sciences (Additional) List.
E. One of the courses among those elected to fulfill the Humanities and Social Sciences Requirements must focus on a non-English speaking culture.
F. It is suggested that one of the courses elected to fulfill the Humanities and Social Sciences Requirements also come from the Science, Technology, and Society (Humanities and Social Science Perspective) List. If not taken as a Humanities and Social Sciences Elective, then a course from this List must be taken as a Free Elective.
[4]The Writing and Speaking Elective Requirement includes one course from the Advanced Writing Electives List or the Communication/Speech Electives List.
[5]Students may choose one from the following list of courses to fulfill the Department Elective Requirement (see THG, footnote 7).
[6]PP 315 and PP 318 offered Fall and Spring semester, respectively. Only one course required.
[7]Language proficiency at FL_102 level is required for graduation.

TECHNOLOGY CURRICULUM IN HORTICULTURAL SCIENCE, GENERAL HORTICULTURE CONCENTRATION
Degree earned: B.S. in Horticultural Science

FRESHMAN YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
ALS 103 Intro. Topics in ALS	1	BIO 183 Introduction to Biology II	4
BIO 181 Introduction to Biology I	4	ENG 112 Composition & Reading	3
ENG 111 Composition & Rhetoric	3	HS 290 Perspectives in Hort. Science	1
HS 201 Principles of Horticultural Science	3	MA 114 Intro. to Finite Math Applic. *or*	
MA 107 Precalculus I	3	MA 121 Elements of Calculus *or*	
Physical Education Elective[1]	1	MA 131 Analytic Geom. & Calculus A	3
	15	Humanities/Social Science. Elective[2]	3
		Writing/Speaking Elective[3]	3
			17

SOPHOMORE YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
CH 101 Chemistry – A Molecular Science	3	ANS/HS 215 Basic Agricultural Genetics	3
CH 102 General Chemistry I Lab	1	CH 201 Chemistry – A Quantitative Science	3
Departmental Elective[4]	3	CH 202 Quantitative Chemistry Lab	1
Foundation Elective[4]	3	SSC 200 Soil Science	4
Foundation Elective[4]	3-4	Foundation Elective[4]	3
Humanities/Social Science. Elective[2]	3	Humanities/Social Science. Elective[2]	3
	16-17		**17**

JUNIOR YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
Foundation Elective	4	BO 421 Plant Physiology	4
Departmental Elective[4]	3	ARE/BUS Elective I[5]	3
Humanities/Social Science Elective[2]	3	Humanities/Social Science. Elective[2]	3
Plant Protection Elective[4]	3-4	Plant Protection Elective[4]	3
Free Elective	3	Specialization Elective[4]	3-4
	16-17		**16-17**

SENIOR YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
ARE/BUS Elective II[5]	3	Departmental Elective[4]	3-4
Humanities/Social Science. Elective[2]	3	Humanities/Social Science. Elective[3]	3
Specialization Elective[4]	3	Specialization Elective[4]	3-4
Specialization Elective[4]	3-4	Physical Education Elective[1]	1
Free Elective	3	Free Elective	3
	15-16		**13-15**

Minimum Hours Required for Graduation: 128[6]

[1]Two courses, one credit hour each, in physical education are required. This requirement includes one Fitness & Wellness course.
[2]The Humanities and Social Sciences Requirements are 21 hours of courses as follows:
A. One course from History Electives List and one course from Literature Electives List.
B. One course from Philosophy Electives, Religion Electives, and Visual and Performing Arts Electives List.
C. One course from the Economics Elective List and one course from the following Elective Lists: Psychology, Politics and Government, Sociology, Anthropology, and Cultural Geography.
D. Two courses from any of the above lists or the Humanities and Social Sciences (Additional) List.
E. One of the courses among those elected to fulfill the Humanities and Social Sciences Requirements must focus on a non-English speaking culture.
F. One of the courses among those elected to fulfill the Humanities and Social Sciences Requirements must come from the Science, Technology, and Society (Humanities and Social Science Perspective) List.
[3]The Writing and Speaking Elective Requirement includes one course from the Advanced Writing Electives List or the Communication/Speech Electives List.
[4]Students must choose a minimum of 13 hours from the Foundation Electives column, 6 hours from the Plant Protection Electives column, 12 hours from the Specialization Electives column, and an additional 12 hours of Departmental Electives. The 12 hours of Departmental electives can be selected form any course in any column below not already taken as a Foundation, Plant Protection, or Specialization requirement. Departmental Electives can also include HS 295, HS 495, or any 500-level HS course as well as up to 6 hours (combined) of HS 492, External Learning Experience and HS 493, Internal Learning Experience. All students are strongly encouraged to participate in a learning experience as part of their undergraduate coursework.

Foundation Electives
(13 hours minimum)
CH 220 Intr. to Organic Chemistry (4,F/S/SS)
BO/ZO 360 Ecology (3, F/SS)
BO/ZO 365 Ecology Lab (1, F/SS)
HS 211 Ornamental Plants I (3, F)
HS 212 Ornamental Plants II (3, S)
HS 301 Plant Propagation (4, F)
SSC 341 Soil Fertility (3, F)
SSC 342 Soil Fertility Lab (1, F)
SSC 461 Soil Physics (3, F)
PY 211 College Physics I (4, F/S)
PY 212 College Physics II (4, F/S)

Plant Protection Electives
(6 hours minimum)
CS 414 Weed Science (3, F)
CS 415 Agron. Pest Mgt. Sys.(3, F)
ENT 425 General Entomology (3,F)
PP 315 Plant Pathology (4, F)
PP 318 Forest Pathology (3, S)
Departmental Electives
(12 hours minimum)

Specialization Electives
(12 hours minimum)
CS 200 Turf Management (4, F)
HS 342 Landscape Horticulture (3, F/S)
HS 371 Interior Plantscapes (3, S[alt, odd])
HS 411 Nursery Management (3,F)
HS 421 Tree Fruit (3, S[alt, odd])
HS 422 Small Fruit (3, S[alt, even])
HS 431 Vegetable Production (4, F)
HS 440 Greenhouse Management (3, F)
HS 442 Prod. of Floricultural Crops (3, S)
HS 462 Post Harvest Physiology (3, S)
HS 471 Tree and Grounds Mgmt. (4, S)

[5]Students are required to take a minimum of 9 hours of coursework in Economics and Business; one course in economic principles (see item C under footnote 2 above), one course in management or marketing (ARE/BUS Elective I), and one course from a set of business and economic courses (ARE/BUS Elective II). Students may choose from the following lists.
[6]PP 315 and PP 318 offered Fall and Spring semester, respectively. Only one course required.
[7]Students may choose one from the following list of courses to fulfill the Department Elective Requirement:

ARE/BUS Elective I List (Select 1)
ARE 303 Farm Management (3, F/S)
ARE 304 Agribusiness Management (3, S)
ARE 311 Agribusiness Markets (3, F/S)
ARE 312 Agribusiness Marketing (3, S)

ARE/BUS Elective II List (Select 1)
ACC 280 Managerial Accounting (3, F/S)
ARE 303 Farm Business Management (3, F/S)
ARE 304 Agribusiness Management (3, S)
ARE 306 Agricultural Law (3, F/S)
ARE 309 Environmental Law and Economic Policy (3, F)
ARE 311 Agricultural Markets (3, F/S)
ARE 312 Agribusiness Marketing (3, S)
ARE 321 Agricultural Financial Management (3, F/S)
BUS 307 Business Law I (3, F/S)
BUS 320 Financial Management (3, F/S/SS)
BUS 330 Human Resource Management (3, F/S)
BUS 360 Marketing Methods (3, F/S)

[8]Language proficiency at FL_102 is required for graduation.

TECHNOLOGY CURRICULUM IN HORTICULTURAL SCIENCE, LANDSCAPE HORTICULTURE CONCENTRATION
Degree earned: B.S. in Horticultural Science

FRESHMAN YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
ALS 103 Intro. Topics in ALS	1	BIO 183	4
BIO 181 General Biology	4	ENG 112 Comp. & Reading	3
ENG 111 Comp. & Rhetoric	3	LAR 234 Intro. to Environ. Design	
MA 107 Precalculus I	3	MA 114 Intro. to Finite Math Applic. or	3
Any 100-level in PE in Fitness & Wellness[1]	1	MA 121 Elements of Calculus or	
HS 201 Principles of Horticulture	3	MA 131 Analytic Geom. & Calculus A	
	15	Physical Education Elective[2]	3
		Humanities/Social Sciences Elective[3]	3
			17-18

SOPHOMORE YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
CH 101 Chemistry – A Molecular Science	3	BO 360 Intro. to Ecology	3
CH 102 General Chemistry I Lab	1	BO 365 Ecology Lab	1
HS 211 Ornamental Plants I or		CH 201 Chemistry – A Quantitative Science	3
HS 290 Perspectives in Horticultural Science	1	CH 202 Quantitative Chemistry Lab	1
Humanities/Social Science. Elective[3]	6	HS 212 Ornamental Plants II	3
Physical Education Elective[2]	1	HS 342 Landscape Horticulture	3
	15	Physical Education Elective[2]	1
			15

JUNIOR YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
LAR 430 Site Planning	3	HS 400 Resident, Landscaping	6
PY 131 Conceptual Physics	4	LAR 457 Lndscp Const Materials Meth & Doc	3
SSC 200 Soil Science[4]	4	PP 315 Prin. of Plant Pathology or	
Humanities/Social Science. Elective[3]	3	PP 318 Forest Pathology[5]	4
Writing/Speaking Elective[4]	3	Humanities/Social Science. Elective[3]	3
	17		**16**

SENIOR YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
ENT 425 General Entomology	3	BO 421 Plant Physiology	4
HS 411 Nursery Mgmt.	3	HS 416 Prin. Orn. Plant Design	3
LAR 400 Landscape Arch. Studio	6	HS 471 Tree & Grounds Maintenance	4
Humanities/Social Science. Elective[3]	3	Humanities/Social Science. Elective[3]	3
	15	Free Elective	3-4
			17-18

Minimum Hours Required for Graduation: 128[6]

[1]Students may choose from any PE 100 level course in Fitness & Wellness.
[2]Four semester hours of physical education (PE) are required for graduation; the first two hours of PE taken may be counted for free elective. If a student chooses not to count these first two hours as free elective, these hours will not count toward graduation and two additional hours of free elective must be completed.
[3]The Humanities and Social Sciences Requirements are 21 hours of courses as follows:
A. One course from History Electives List and one course from Literature Electives List.
B. One course from Philosophy Electives, Religion Electives, and Visual and Performing Arts Electives List.
C. One course from the Economics Elective List and one course from the following Elective Lists: Psychology, Politics and Government, Sociology, Anthropology, and Cultural Geography.
D. Two courses from any of the above lists or the Humanities and Social Sciences (Additional) List.
E. One of the courses among those elected to fulfill the Humanities and Social Sciences Requirements must focus on a non-English speaking culture.
F. It is suggested that one of the courses elected to fulfill the Humanities and Social Sciences Requirements also come from the Science, Technology, and Society (Humanities and Social Science Perspective) List. If not taken as a Humanities and Social Sciences Elective, then a course from this List must be taken as a Free Elective.
[4]The Writing and Speaking Elective Requirement includes one course from the Advanced Writing Electives List or the Communication/Speech Electives List.
[5]PP 315 and PP 318 offered Fall and Spring semester, respectively. Only one course required.
[6]Language proficiency at FL_102 is required for graduation.

SCIENCE CURRICULUM IN HORTICULTURAL SCIENCE, ORNAMENTALS CONCENTRATION
Degree earned: B.S. in Horticultural Science

FRESHMAN YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
ALS 103 Intro. Topics in ALS	1	CH 101 Chemistry – A Molecular Science	3
BIO 125 General Biology	1	CH 102 General Chemistry Lab	1
ENG 111 Comp. & Rhetoric	3	ENG 112 Comp. & Reading	3
MA 107 Precalculus I	3	HS 201 Prin. of Horticulture	3
PE 10X[1] Health & Physical Fitness[2]	1	MA 121 Elements of Calculus *or*	
Humanities/Social Science. Elective[3]	3	MA 131 Calculus for Life & Mgmt Sci.	3
	15	Physical Education Elective[2]	1
			14

SOPHOMORE YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
BO 200 Plant Life	4	CH 221 Organic Chemistry I	4
CH 201 Chemistry – A Quantitative Science	3	HS 212 Ornamental Plants II	3
CH 127 Quantitative Chemistry Lab	1	PY 212 College Physics II	4
HS 211 Ornamental Plants I	3	SSC 200 Soil Science	4
HS 290 Perspectives in Hort. Science	1	Physical Education Elective[2]	1
PY 211 College Physics I	4		**16**
Physical Education Elective[2]	1		
	17		

JUNIOR YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
CH 223 Organic Chemistry II	4	BO 421 Plant Physiology	4
ENT 425 General Entomology	3	PP 315 Prin. of Plant Pathology or	
HS 301 Plant Propagation	4	PP 318 Forest Pathology[5]	4
Humanities/Social Science. Elective[3]	3	Humanities/Social Science. Elective[3]	3
Free Elective	3	Writing/Speaking Elective[4]	3
	17	Free Elective	3
			17

SENIOR YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
GN 411 Prin. of Genetics	4	BCH 451 Prin. of Biochemistry	4
GN 412 Elementary Genetics Lab	1	HS 471 Tree and Grounds Maintenance	4
HS 411 Nursery Mgmt.	3	Humanities/Social Science. Elective[3]	6
Humanities/Social Science. Elective[3]	6	Free Elective	2
Free Elective	2		**16**
	16		

Minimum Hours Required for Graduation: 128[6]

[1]Students may choose from any PE 100 level course in Fitness & Wellness.
[2]Four semester hours of physical education (PE) are required for graduation; the first two hours of PE taken may be counted for free elective. If a student chooses not to count these first two hours as free elective, these hours will not count toward graduation and two additional hours of free elective must be completed.
[3]The Humanities and Social Sciences Requirements are 21 hours of courses as follows:
A. One course from History Electives List and one course from Literature Electives List.
B. One course from Philosophy Electives, Religion Electives, and Visual and Performing Arts Electives List.
C. One course from the Economics Elective List and one course from the following Elective Lists: Psychology, Politics and Government, Sociology, Anthropology, and Cultural Geography.
D. Two courses from any of the above lists or the Humanities and Social Sciences (Additional) List.
E. One of the courses among those elected to fulfill the Humanities and Social Sciences Requirements must focus on a non-English speaking culture.
F. It is suggested that one of the courses elected to fulfill the Humanities and Social Sciences Requirements also come from the Science, Technology, and Society (Humanities and Social Science Perspective) List. If not taken as a Humanities and Social Sciences Elective, then a course from this List must be taken as a Free Elective.
[4]The Writing and Speaking Elective Requirement includes one course from the Advanced Writing Electives List or the Communication/Speech Electives List.
[5]PP 315 and PP 318 offered Fall and Spring semester, respectively. Only one course required.
[6]Language proficiency at FL_102 level is required for graduation.

DEPARTMENT OF MICROBIOLOGY

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Phone: (919) 515-2391

H. M. Hassan, *Head*
G. H. Luginbuhl, *Undergraduate Coordinator*
S.M. Laster, *Director of Graduate Programs*

Professors: P.E. Bishop (USDA), W.J. Dobrogosz, H.M. Hassan, G.H. Luginbuhl, J.M. Mackenzie, L. W. Parks;*Professors Emeriti:* G.H. Elkan, J.J. Perry; *Adjunct Professors:* I.A. Casas, R.E. Kanich, T. Melton, S.R. Tove; *Associate Professors:* S.M. Laster, E.S. Miller, I.T.D. Petty; *Adjunct Associate Professors:* K.T. Kleeman, J.M. Ligon; *Assistant Professor:* J. W. Brown, M.R. Hyman, S.J. Libby; *Adjunct Assistant Professors:*W.M. Casey, W.S. Dallas, S.H. Shore; *Teaching Technician:* W.P. Crumpler, V.M. Knowlton; *Lab Supervisor:* T.J. Schneeweis; *Associate Members of the Faculty:* D.T. Brown (Biochemistry), F.J. Fuller (Veterinary Medicine), T.R. Klaenhammer (Food Science), W.E. Kloos (Genetics), P.E. Orndorff (Veterinary Medicine), B. Sherry (Veterinary Medicine), J.C.H. Shih (Poultry Science). R.G. Upchurch (Plant Pathology).

The microbiology program provides basic preparation in microbiology, virology and immunology for professional microbiologists and students in other sciences and an awareness of the microbial world as it relates to our daily lives for non-science majors.

Microbiology is concerned with the growth and development, physiology, classification, ecology, genetics and other aspects of the life processes of an array of microscopic, generally single-celled, organisms and viruses. These organisms frequently serve as model systems for elucidation of fundamental processes that are common to all living cells. Most of the major discoveries that have produced the spectacular advances in biology and genomic science during the past decade have resulted from studies of microbial systems. Future developments in biotechnology, production of food and fuel, and human and animal health will rely heavily on understanding microbial processes.

OPPORTUNITIES

Microbiologists are employed in university, governmental and industrial research laboratories, diagnostic, environmental and quality control laboratories, teaching, and technical sales and service positions.

CURRICULA

The microbiology curriculum leads to a Bachelor of Science degree and is designed to provide the student with a strong foundation in mathematics, chemistry, and physics, and skills in oral and written communication. The student will also gain broad general knowledge of molecular and cellular biology as well as a foundation in the basic areas of microbiology, virology, and immunology. Graduates of this curriculum will be prepared for work in research laboratories and production facilities or for further study in graduate or professional schools.

MINOR IN MICROBIOLOGY

The Department of Microbiology offers an undergraduate minor available to all baccalaureate degree students at North Carolina State University who are not majoring in microbiology. The minor is especially appropriate for (but not limited to) students majoring in the biological or agricultural sciences, physical sciences or science education. The minor requires 15 semester hours including 8 hours of required courses and 7 hours from a group of restricted electives. Any prerequisite courses are in addition to these courses. A grade of C or better is required for all courses taken to fulfill the minor requirements.

CURRICULUM IN MICROBIOLOGY

Degree earned: B.S. in Microbiology

FRESHMAN YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
ALS 103 Intro. Topics in ALS	1	BIO 183 Intro. to Biology II	4
CH 101 Chemistry - A Molecular Science	3	CH 221 Organic Chemistry I	4
CH 102 General Chemistry I Lab	1	ENG 112 Comp. & Reading	3
ENG 111 Comp. & Rhetoric	3	MA 231 Calculus for Life & Science Mgmt. B	3
MA 131Calculus for Life & Mgmt. Science A	3	Any 100-level PE in Fitness & Wellness	1
BIO 181 Intro. to Biology I	4		15
	15		

SOPHOMORE YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
CH 223 Organic Chemistry II	4	CH 201 Chemistry - A Quantitative Science	3
PY 211 General Physics I	4	CH 202 Quantitative Chemistry Lab	1
ST 311 Intro. to Statistics	3	PY 212 General Physics II	4
Humanities/Social Science Elective[1]	3	MB 351 General Microbiology	3
Free Elective	3	MB 352 General Microbiology Lab	1
	17	Humanities/Social Science Elective	3
		Physical Education Elective	1
			16

JUNIOR YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
GN 411 Prin. of Genetics	4	BO(ZO) 414 Cell Biology	3
MB 411 Medical Microbiology	3	BCH 451 Elem. Biochemistry	4
MB 412 Medical Microbiology Lab	1	MB 409 Microbial Diversity	3
Communication Elective[2]	3	Humanities/Social Science Elective	3
Humanities/Social Science Elective	3	Free Elective	3
Free Elective	3		16
	17		

SENIOR YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
BCH 452 Biochem. Lab	2	ENG 333 Comm.Science & Resch.	3
MB 490 Senior Seminar in Micro.	1	Humanities/Social Science. Elective	3
MB 414 Metabolic Regulation	3	Humanities/Social Science. Elective	3
Humanities/Social Science. Elective	3	Microbiology Elective	3
Microbiology Elective	3	Free Elective	3
Free Elective	3		**15**
	15		

Minimum Hours Required for Graduation[3] 127

[1]These courses must be selected from the approved GER listing for Humanities and Social Sciences as follows: 6 credits in history and/or literature, 3 credits from philosophy, religion or visual and performing arts, 6 credits from two different areas in psychology, economics, politics and government, sociology, anthropology or cultural geography, 3 credits of science, technology and society from a humanities and social science perspective. The final 3 credits may be from any courses in the aforementioned categories. At least one course in the Humanities and Social Sciences must focus on a non-English speaking culture.
[2]Course must be selected from the approved GER Communication/Speech Electives List.
[3]Students must have demonstrated foreign language proficiency at the FL_102 level.

CURRICULA IN NATURAL RESOURCES

A. W. Oltmans, *Undergraduate Coordinator,* Agricultural and Resource Economics, Nelson Hall, Room 233E
H. J. Kleiss, *Undergraduate Coordinator,* Soil Science, Williams Hall, Room 2321

Wise use of all our natural resources (soil, water, air, minerals, flora, fauna and people) for the benefit of current and future members of society is the goal of natural resource management. This important challenge recognizes the interdependence of people with their environment and requires an integrated, multi-disciplinary approach to solving society's resource problems. Population growth, rising incomes, life style changes and urbanization lead to more intensive use of all natural resources. These trends present challenges to resource managers who must be trained in the basic principles of several disciplines in order to develop and apply sound management strategies to our resource problems. Natural resource professionals must understand resources and the social systems governing their use. They must be able to work in teams to analyze potential effects of resource use and to design ways to make efficient use of natural and environmental resources for current and future generations.

To accommodate the breadth and complexity of natural resource management, the Bachelor of Science degree in natural resources is a campus-wide program involving three colleges and four departments that administer seven concentrations. A common core of 84 hours of course work provides a balanced foundation in communication, humanities, social sciences, mathematics and the natural sciences. The core course requirements include a freshman orientation course and a senior level applications course that natural resource majors in all concentrations must complete. Within the College of Agriculture and Life Sciences, three concentrations are available: Economics and Management, Soil Resources and Soil and Water Systems. For information on other concentrations see Forestry and Marine, Earth and Atmospheric Sciences.

CURRICULUM IN NATURAL RESOURCES ECONOMICS AND MANAGEMENT CONCENTRATION

Degree earned: B.S. in Natural Resources

FRESHMAN YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
BIO 125 General Biology	4	CH 101 Chemistry – A Molecular Science *and*	3
CFR 134 Computers in Natural Resources	1	CH 102 General Chemistry Lab	1
ENG 111 Comp. & Rhetoric	3	ENG 112 Comp. & Reading	3
MA 131 Calculus for Life & Mgmt. Science A	4	MA 231 Calculus for Life & Mgmt. Science B	3
NR 100 Intro. to Natural Resources	2	PS 201 Intro. to American Govt. *or*	
Any 100-level PE in Fitness & Wellness[1]	1	PS 202 State & Local Govt.	3
	15	Physical Education Elective[2]	1
			14

SOPHOMORE YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
ARE 201 Intro. Agric. & Res. Economics *or*		ARE(EC) 336 Intro. Res & Env. Economics[4]	3
EC 201 Intro. to Economics I	3	BO 200 Plant Life *or*	
CH 201 Chemistry – A Quantitative Science *and*	3	ZO 150 Intro. to Animal Kingdom	4
CH 202 Quantitative Chemistry Lab	1	MA 114 Intro. to Finite Math. Appl.	3
PY 211 College Physic I *or*		MEA 101 Geology 1:Physical	3
PY 205 Physics for Engr. & Science I	4	MEA 110 Geology I Lab	1
Communication Elective[3]	3		**14**
	14		

JUNIOR YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
ARE(EC) 301 Intermediate Microeconomics	3	ACC 220 Accounting II *or*	
ARE 303 Farm Bus. Mgmt *or*		ACC 280 Managerial Accounting	3
BUS(EC) 310 Managerial Economics	3	ENG 332 Comm. for Bus. & Mgmt *or*	
BO 360 Intro. to Ecology[4]	3	ENG 333 Comm. for Science & Research	3
BO 365 Ecology Lab[4]	1	History or Literature Elective[5]	3
SSC 200 Soil Science	4	Phil., Relig., Vis/Perf. Arts Elective[5]	3
ST(BUS) 350 Economics & Bus. Statistics	3	Restricted Elective[6]	3
	17		**15**

SENIOR YEAR

Fall Semester	*Credits*	*Spring*	*Credits*
ARE 306 Agricultural Law *or*		BUS 455 Quant. Methods in Mgmt *or*	
ARE 309 Environ. Law & Economic Policy	3	EC 451 Intro. to Econometrics	3
ARE 321 Agric. Financial Mgmt *or*		EC 410 Public Finance	3
BUS 320 Financial Mgmt.	3	NR 400 Natural Resource Mgmt	4
ARE (EC) 436 Environ. Economics	3	Restricted Elective[6]	3
History or Literature Elective[5]	3	Social Science Elective[5,7]	3
Restricted Elective[6]	3		16
	15		

Minimum Hours Required for Graduation: 120

Note: A minimum grade of C in ENG 111 and ENG 112, a grade point average of 2.0 in all ACC, BUS, EC and ECG courses attempted, and foreign language proficiency at the FL_102 level are required to be eligible for graduation.
[1]MA 141 and MA 241 may be taken in lieu of MA 131and MA 231.
[2]Four credit hours of PE (including any 100-level PE) are required for graduation.
[3]Select from COM 110, COM 112, COM 146 or COM 211.
[4]Science, Technology, and Society courses: ARE(EC) 336 from Humanities/Social Sciences Perspective and BO 360/365 form Science/Perspective.
[5]One of these courses must focus on a non-English speaking culture.
[6]Restricted Electives include: BAE(SSC) 323, BO 421, CS 411, FOR 252, FOR 401, FW(ZO) 353, FW(FOR) 404, FW(ZO)420, MEA 130, MEA 135, MEA 140, MEA(ZO) 220, MEA 300, MEA 311, MEA 313, NR 300, SSC 361, SSC 370, SSC 461, ZO 441 or ZO 442.
[7]Select from Psychology, Politics & Government, Sociology, Anthropology, and Cultural Geography Electives lists.

CURRICULUM IN NATURAL RESOURCES, SOIL RESOURCES CONCENTRATION
Degree earned: B.S. in Natural Resources

FRESHMAN YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
ALS 103 Intro. Topics in ALS	1	CH 101 Chemistry - A Molecular Science	3
BIO 125 General Biology	4	CH 102 General Chemistry Lab	1
CFR 134 Computers in Natural Resources	1	ENG 112 Comp. & Reading[1]	3
ENG 111 Comp. & Rhetoric[1]	3	MA 132 Comp. Math for Life & Mgmt. Science	1
MA 131 Analytic Geom. & Calculus A[2]	3	MA 231 Analytic Geom. & Calc. B[2]	3
NR 100 Intro. to Natural Resources	2	PS 201 Intro. to American Govt. *or*	
Any 100-level PE in Fitness & Wellness[3]	1	PS 202 State & Local Govt.	3
	15	History/Literature Elective[4]	3
			17

SOPHOMORE YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
ARE 201 Intro. Agric. & Res. Economics *or*		PY 211 College Physics I	4
EC 201 Intro.to Economics I	3	SSC 200 Soil Science	4
BO 200 Plant Life	4	ST 311 Intro. to Statistics	3
CH 201 Chemistry - A Quantitative Science	3	Comm./Speech Elective[5]	3
CH 202 Quantitative Chemistry Lab	1	Physical Education Elective[3]	1
MEA 101 Geology I:Physical	3		15
MEA 110 Geology I Lab	1		
	15		

JUNIOR YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
ARE (EC) 336 Intro. to Res. & Envi. Econ.	3	CH 220 Intro. Organic Chemistry	4
BO 360 Intro. to Ecology	3	NR 300 Natural Resource Measurements	4
BO 365 Ecology Lab	1	SSC 452 Soil Classification	4
FOR 353 Air Photo Interp. & Photogram	3	History/Literature Elective[4]	3
MB 351 General Microbiology *or*			15
MEA 410 Intro. to Geological Materials	4		
SSC 341 Soil Fertility & Fertilizers	3		
SSC 342 Soil Fertility Lab	1		
	18		

SENIOR YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
BAE (SSC) 323 Water Mgmt.	3	NR 400 Natural Resource Mgmt	4
BAE (SSC) 324 Elementary Surveying	1	SSC 361 Role of Soils in Envir. Mgmt.	3
BAE 471 Land Resources Engr. *or*		Phil, Relig, Vis/Perf. Arts Elective[4]	3
FOR 401 Watershed & Wetlands Hydrol. *or*		Social Science Elective[6]	3
SSC 562 Environ. Applic. of Soil Science	3-4	Free Elective	3
CS 200 Intro. to Turfgrass Mgmt. *or*			**16**
CS 312 Grassland Mgmt.	3		
ENG 331 Comm. for Engr. & Tech *or*			
ENG 333 Comm. for Science & Res.	3		
SSC 461 Soil Phys. Prop. & Plant Growth	3		
	16-17		

Minimum Hours Required for Graduation **127/128**

[1]Grade of C or better required for ENG 111 and ENG 112.
[2]MA 141 and MA 241 may be taken in lieu of MA 131 and MA 231.
[3]Two hours of PE (including any 100-level Fitness & Wellness) are required for graduation.
[4]One of these courses must come from a list of courses that focus on a non-English speaking culture.
[5]Select from COM 110, COM 112, COM 146 or COM 211.
[6]Select from Psychology, Politics and Government, Sociology, Anthropology and Cultural Geography electives lists.
Notes:Foreign Language proficiency at the FL_102 level is required for graduation. It is suggested that one course elected to fulfill the Humanities and Social Sciences requirements also come from the Science, Technology, and Society (Humanities and Social Sciences Perspective) elective list. If not taken as a Humanities and Social Sciences Elective, then a course from this list must be taken as a Free Elective.

CURRICULUM IN NATURAL RESOURCES, SOIL AND WATER SYSTEMS
Degree earned: B.S. in Natural Resources

FRESHMAN YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
ALS 103 Intro. Topics in ALS	1	CH 101 Chemistry - A Molecular Science	3
BIO 125 General Biology	4	CH 102 General Chemistry Lab	1
CFR 134 Computers in Natural Resources	1	ENG 112 Comp. & Reading[1]	3
ENG 111 Comp. & Rhetoric[1]	3	MA 132 Comp. Math for Life & Mgmt. Science	1
MA 131 Analytic Geom. & Calculus A[2]	3	MA 231 Analytic Geom. & Calc. B[2]	3
NR 100 Intro. to Natural Resources	2	PS 201 Intro. to American Govt. *or*	
Any 100-level PE in Fitness & Wellness[3]	1	PS 202 State & Local Govt.	3
	15	History/Literature Elective[4]	3
			17

SOPHOMORE YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
BO 360 Intro. to Ecology	3	MEA 101 Geology I: Physical	3
BO 365 Ecology Lab	1	MEA 110 Geology I Lab	1
ARE 201 Intro. Agric. & Res. Economics *or*		PY 211 College Physics I	4
EC 201 Intro. to Economics I	3	ST 311 Intro. to Statistics	3
BO 200 Plant Life	4	Comm./Speech Elective[5]	3
CH 201 Chemistry - A Quantitative Science	3		**14**
CH 202 Quantative Chemistry Lab	1		
Physical Education Elective[3]	1		
	16		

JUNIOR YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
ARE(EC) 336 Intro. to Res. & Environ. Econ.	3	ENG 331 Comm. for Engr. & Technology *or*	
BAE (SSC) 323 Water Mgmt.	3	ENG 333 Comm. for Science & Research	3
BAE (SSC) 324 Elementary Surveying	1	MEA 200 Intro. to Oceanography	3
SSC 200 Soil Science	4	NR 300 Natural Resource Measurements	4
ZO 419 Limnology	4	SSC 361 Role of Soils in Environ. Mgmt.	3
History/Literature Elective[4]	3	SSC 452 Soil Classification	4
	18		**17**

SENIOR YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
FOR 401 Watershed & Wetlands Hydrology *or*		ARE 309 Environ. Law Economic Policy *or*	
MEA 585 Hydrogeology *or*		FOR 472 Renewable Res. Policy and Mgmt.	3
Advised Elective	3	BAE 471 Land Resources Environ. Engr. *or*	
SSC 461 Soil Physical Properties & Plant Grth.	3	SSC 562 Environ. Applications of Soil Science	3
Phil., Relig., Vis/Perf.Arts Elective[4]	3	NR 400 Natural Resource Mgmt	4
Restricted Elective[6]	3-4	ZO 460 Aquatic Natural History Lab	2
	16-17	Social Science Elective[7]	3
			15
		Minimum Hours Required for Graduation	**127/128**

[1]Grade of C or better required for ENG 111 and ENG 112.
[2]MA 141 and MA 241 may be taken in lieu of MA 131 and MA 231.
[3]Two hours of PE (including any 100-level Fitness & Wellness) are required for graduation.
[4]One of these courses must come from a list of courses that focus on a non-English speaking culture.
[5]Select from COM 110, COM 112, COM 146 or COM 211.
[6]Select from Psychology, Politics and Government, Sociology, Anthropology and Cultural Geography electives lists.
Notes:Foreign Language proficiency at the FL_102 level is required for graduation. It is suggested that one course elected to fulfill the Humanities and Social Sciences requirements also come from the Science, Technology, and Society (Humanities and Social Sciences Perspective) elective list. If not taken as a Humanities and Social Sciences Elective, then a course from this list must be taken as a Free Elective.

DEPARTMENT OF PLANT PATHOLOGY

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L. F. Grand, *Teaching Coordinator*
D. M. Benson, *Director of Graduate Programs*

Professors: J. E. Bailey, O. W. Barnett Jr., D. M. Benson, R. I. Bruck, C. L. Campbell, M. E. Daub, J. M. Davis, L. F. Grand, A. S. Heagle (USDA), J.S. Huang, S. Leath (USDA), S.A. Lommel, T.A. Melton, J. W. Moyer, G. A. Payne, J.B. Ristaino, D. F. Ritchie, H. D. Shew, P. B. Shoemaker, T. B. Sutton; *Professors Emeriti:* J. L. Apple, C. W. Averre, III, R. Aycock, K.R. Barker, D.F. Bateman, M.K. Beute, G. V. Gooding Jr., R.K. Jones, A. Kelman (University Distinguished Scholar), C.E. Main, R. D. Milholland, N. T. Powell, R.A. Reinert (USDA), J. P. Ross, J. N. Sasser, H. W. Spurr Jr. (USDA), D. L. Strider,, H. H. Triantaphyllou, J. C. Wells, N. N. Winstead; *Associate Professors:* D. Byrd, M. L. Carson (USDA), E.L. Davis, B. C. Haning, J.A. Kolmer, P. B. Lindgren, C. H. Opperman, R. G. Upchurch (USDA); *Assistant Professors:* M. A. Cubeta, G. Holmes, F. J. Louws, H. Wetzel; *Adunct & Associate Members of the Faculty:* M. A. Conkling (Genetics), D. Cookmeyer (US Army), E. B. Cowling (Forestry), C.B. Davey (Forestry), W. M. Hagler Jr. (Animal Science, Poultry Science), G. Hellman (R.J. Reynolds), C. L. Hemenway (Biochemistry), C.S. Hodges (USFS), J.L. Imbriani (NCDA), D.T. Kaplin (USDA, FL), M.D. Law (Novartis), R. C. Rufty (Crop Science), S. Spencer (NCDA), V. Subbiah (R.J. Reynolds), C. G. VanDyke (Botany); *Senior Researcher:* B.B. Shrew; *Researhers:* S.R. Koenning, Z. Pesic-Van Esbroeck; *Research/Extension Specialist:* W.O. Cline.

Undergraduate instruction in plant pathology is designed to provide introductory and advanced courses on the nature and control of plant diseases to students majoring in crop science, horticultural science, agricultural education and forestry. It also provides fundamental training necessary for graduate study in plant pathology.

OPPORTUNITIES

Employment in research, extension and teaching is available to graduates with advanced degrees in plant pathology. Research openings are with the U.S. Department of Agriculture, state experiment stations, industry and private consulting. The rapid development of agricultural chemicals, biotechnology and other methods for disease control offers numerous opportunities.

DEPARTMENT OF POULTRY SCIENCE

Scott Hall, Room 203
Phone: (919) 515-2626

G. B. Havenstein, *Head*
F. T. Jones, *Deportment Extension Leader*
S. L. Pardue, *Undergraduate Coordinator*
T. D. Siopes, *Director of Graduate Programs*

Alumni Distinguished Undergraduate Professor: C. R. Parkhurst; *Professors:* J. T. Brake, T. A. Carter, V. L. Christensen, W. J. Croom, F. W. Edens, J. D. Garlich, W. M. Hagler Jr., G. B. Havenstein, F. T. Jones, J. F. Ort, S.L. Pardue, M. A. Qureshi, B.W. Sheldon, J. C. H. Shih, T. D. Siopes; M. J. Wineland; *Adjunct Professors:* M. R. Bakst, D. Balnave, W. L. Bryden, R. R. Dietert, K. K. Krueger, K. A. Schat; *Professors Emeriti:* W. G. Andrews, R. E. Cook, E. W. Glazener, P. B. Hamilton, J. R. Harris, C. H. Hill, G. A. Martin, W. C. Mills Jr., T. B. Morris; *Associate Professors:* K. E. Anderson, G. S. Davis, P. R. Ferket, J.L. Grimes, J. N. Petitte; *Adjunct Associate Professors:* W. E. Brown, C. A. Ricks, J. L. Tyczkowski; C. E. Whitfill; *Assistant Professors:* D. K. Carver, J. L. Grimes, C. M. Williams; *Adjunct Assistant Professor:* R. P. Gildersleeve; *Associate Members of Faculty:* R. W. Bottcher (Biological and Agricultural Engineering), P. A. Curtis (Food Science), B. W. Sheldon (Food Science), D. P. Wages (College of Veterinary Medicine).

The Department of Poultry Science provides instruction in the principles of vertically integrated poultry production and in such related fields as nutrition, physiology, genetics, immunology, toxicology, biotechnology, and general poultry management. Through teaching, research, and extension, the department

serves students, poultry producers, and allied industries. Poultry production has increased rapidly during the last several decades and ranks first in North Carolina as a source of agricultural income. North Carolina ranks third nationally in the production of poultry products; the climatic and economic conditions in the state provide a sound base for continued expansion.

OPPORTUNITIES

The change from small farm operations to large commercial poultry enterprises has created more specialized positions than there are available poultry graduates. Production-oriented positions and off-the-farm operations in activities such as processing and distribution offer new job opportunities. The allied industries -- feed, equipment, financing, pharmaceutical and other supplies -- need more employees trained in poultry science. Graduates hold positions as managers and field representatives for businesses identified with or serving the poultry industry. Graduates are also employed in communication and public relations and as teachers and extension and research specialists. Some graduates have their own poultry businesses.

CURRICULA

Students desiring the Bachelor of Science with a major in poultry science may choose either the science or technology curriculum offered by the Department of Poultry Science. (See the Graduate Catalog). One may obtain a double major in certain other curricula through careful use of electives and/or summer school attendance. The student should consult the undergraduate advisers in the department(s) concerned. Currently, the pre-veterinary science student may utilize all requirements toward a Bachelor of Science degree in the science option. See the freshman year and basic requirements for College of Agriculture and Life Sciences.

The science curriculum is for the student interested in the basic biological and physical sciences. The student is better prepared for advanced study in various disciplines such as genetics, nutrition, physiology, and pathology. Several pre-veterinary students are currently enrolled in this curriculum and are seeking a Bachelor of Science degree in poultry science. (See Pre-Professional Program in Veterinary Medicine).

The technology curriculum in poultry science is designed to prepare students for direct entry into the poultry industry upon graduation; allows a greater selection of courses in business and economics; and offers a student both basic and applied knowledge in poultry production which can be used directly in a poultry operation upon graduation.

SCIENCE CURRICULUM IN POULTRY SCIENCE
Degree earned: B.S. in Poultry Science

FRESHMAN YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
ALS 103 Intro. Topics in ALS	1	CH 101 General Chemistry I	3
BIO 125 General Biology	4	CH 102 General Chemistry I Lab	1
ENG 111 Comp. & Rhetoric	3	COM 110 Public Speaking	3
MA 107 PreCalculus Algebra & Trig. I	3	ENG 112 Comp. & Reading	3
Any 100-level PE in Fitness & Wellness[1]	1	MA 121 Elements of Calculus *or*	
Humanities/Social Science. Elective[2]	3	MA 131 Analytic Geom. & Calculus A	3
	15	Free Elective	3
			16

SOPHOMORE YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
ARE 201 Intro. Agric. & Res. Economics	3	CH 223 Organic Chemistry II	4
BAE 121 Computer Applic. in ALS *or*		ST 311 Intro. to Statistics	3
CSC 200 Intro. to Computers & Uses	3	Group A Elective[3]	4
CH 221 Organic Chemistry I	4	Humanities/Social Science. Electives[2]	6
PO 201 Poultry Science & Prod.	4		**17**
PO 290 Poultry Seminar	1		
Physical Education Elective	1		
	16		

JUNIOR YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
CH 201 Chemistry – A Quantitative Science	3	ENG 333 Comm. for Science & Research	3
CH 202 Quantitative Chemistry Lab	1	GN 411 Prin. of Genetics	4
PO (ANS,FS) 322 Muscle Foods & Eggs	3	ACC/ARE/BUS/EC Elective[4]	3
PO (ANS,NTR) 415 Comparative Nutrition[3]	3	Humanities/Social Science. Electives[2]	3
PY 131 Conceptual Physics *or*		Free Elective	3
PY 211 College Physics I	4		**16**
Humanities/Social Science. Electives[2]	3		
	17		

SENIOR YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
MB 351 General Microbiology	3	PO 430 Poultry Breeding	3
MB 352 General Microbiology Lab	1	VMF 401Poultry Diseases	4
PO 405 Avian Physiology	4	Group A Elective[3]	3
Humanities/Social Science. Electives[2]	3	Free Electives	6
Free Elective	4		**16**
	15		

Minimum Hours Required for Graduation: 128

[1]Two semester hours of Physical Education (PE) credit are required for graduation.
[2] a) At least one HSS course must focus on a non-English speaking culture. In addition, one course must be from the Science, Technology, and Society HSS Electives list.
b) Two courses from History Electives and Literature Electives list.
c) One course in the study of philosophy, religion, or the visual and performing arts
d) Two courses from the HSS Electives list.
e) One course in the study of psychology, politics and government, sociology, anthropology, or cultural geography.
[3]One course from the Group A Electives listed in the CALS section of the NC State Undergraduate Bulletin.
[4]One course in the study of accounting, agricultural and resource economics, business management, or economics.
[5]Foreign language proficiency at the FL_102 level will be required for graduation.

TECHNOLOGY CURRICULUM IN POULTRY SCIENCE
Degree earned: B.S. in Poultry Science

FRESHMAN YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
ALS 103 Intro. Topics in ALS	1	CH 101 General Chemistry I	3
BIO 125 General Biology	4	CH 102 General Chemistry I Lab	1
ENG 111 Comp. & Rhetoric	3	COM 110 Public Speaking	3
MA 107 PreCalculus I	3	ENG 112 Comp. & Reading	3
Any 100-level PE in Fitness & Wellness[1]	1	MA 121 Elements of Calculus *or*	
Humanities/Social Science. Elective[2]	3	MA 131 Analytic Geom. & Calculus A	4
	15	Free Elective	1
			15

SOPHOMORE YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
ARE 201 Intro. Agric. & Res. Economics	3	BAE 121 Computer Applications in ALS *or*	
CH 220 Intro. Organic Chemistry or	3	CSC 200 Intro. to Computers & Uses	3
CH 221 Organic Chemistry I	1	CH 201 General Chemistry II	3
PO 201 Poultry Science & Prod.	4	CH 202 General Chemistry II Lab	1
PO 290 Poultry Seminar	1	ARE/EC Elective[3]	3
Humanities/Social Science. Elective[2]	3	Poultry Elective[4]	2
Physical Education Elective	1	Free Elective	3-4
	16	Physical Education Elective	1
			16-17

JUNIOR YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
GN 301 Genetics in Human Affairs *or*		ENG 333 Comm. for Science & Research	3
GN 411 Prin. of Genetics	3-4	PO 430 Poultry Breeding	3
PO (ANS,FS) 322 Muscle Foods & Eggs	3	Group A,B,C Electives[6]	6
PO (ANS,NTR) 415 Comparative Nutrition[3]	3	Humanities/Social Science. Electives[2]	3
ACC/ARE/BUS/EC Elective[5]	3	Free Elective	3
Humanities/Social Science. Electives[2]	3		**18**
	15-16		

SENIOR YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
MB 351 General Microbiology	3	PO 425 Feed Mill Mgmt./Form.	3
MB 352 General Microbiology Lab	1	VMF 401Poultry Diseases	4
PO 405 Avian Physiology	4	Group A Elective[7]	4
Humanities/Social Science. Electives[2]	3	Poultry Elective[4]	2
Poultry Elective[4]	2	Free Elective	3
Free Elective	3		**16**
	16		

Minimum Hours Required for Graduation: 128

[1]Two semester hours of Physical Education (PE) credit are required for graduation.
[2] a) At least one HSS course must focus on a non-English speaking culture. In addition, one course must be from the Science, Technology, and Society HSS Electives list.
b) Two courses from History Electives and Literature Electives list.
c) One course in the study of philosophy, religion, or the visual and performing arts.
d) One course in the study of psychology, politics and government, sociology, anthropology, or cultural geography.
[3]One course from the following: ARE 210, ARE(EC) 301, ARE 311, ARE(EC) 336, ARE 433, ARE 436, EC 202, EC 302, or EC 372.
[4]Select 3 courses from the following: PO 301, PO 420, PO 422, or PO 423.
[5]One course in the study of agricultural and resource economics, business management, accounting, or economics.
[6]Courses from the A, B, C, Electives listed in the NC State Undergraduate Bulletin.
[7]One course from the Group A Electives listed in the NC State Undergraduate Bulletin.
[8]Foreign language proficiency at the FL_102 level is required for graduation.

DEPARTMENT OF SOCIOLOGY AND ANTHROPOLOGY

http://sasw.chass.ncsu.edu/s&a/s&ahmpg.htm
1911 Building, Room 301
Phone: (919) 515-3180

W. B. Clifford, *Head*
E. M. Woodrum, *Associate Head*
R. S. Ellovich, *Undergraduate Administrator*
J.C. Leiter, *Director of Graduate Programs*
S.C. Lilley, *Department Extension Leader*

Professors: V. M. Aldige, W. B. Clifford, L. R. Della Fave, T. J. Hoban, J. C. Leiter, R. L. Moxley, L. B. Otto, B. J. Risman, M. D. Schulman, D. T. Tomaskovic-Devey, R. C. Wimberley, E. M. Woodrum, M. T. Zingraff; *Professors Emeriti:* J. N. Collins, E. M. Crawford, V. E. Hamilton, T. N. Hobgood Jr., C. P. Marsh, M. E. Voland, J. N. Young; *Associate Professors:* M. P. Atkinson, R. F. Czaja, S. K. Garber, T. N. Greenstein, S. C. Lilley, P. L. McCall, I. Rovner, A. L. Schiller, M. L. Schwalbe, M.E. Thomas, M. S. Thompson, R. J. Thomson, K. M. Troost, M. L. Walek, J. M. Wallace, C. R. Zimmer; *Associate Professors Emeriti:* R. C. Brisson, A. C. Davis, G. S. Nickerson, J. C. Peck, P. P. Thompson; *Adjunct Associate Professor:* J.F. Thigpen (East Carolina University); *Assistant Professors:* R. S. Ellovich, R.L. Engen W. R. Smith; *Assistant Professors Emeriti:* C. G. Dawson, T. M. Hyman; *Associate Members of the Faculty:* R. D. Mustian (Department of Agricultural and Extension Education), M. M. Sawhney (CHASS Dean's Office), M.A. Zahn (CHASS Dean's Office).

This Department teaches students the principles and techniques for understanding human group behavior. More specifically the department seeks to educate students in understanding communities and organizations and the people who live and work within them, to qualify exceptional students at the undergraduate and graduate level for sociological research, teaching, and extension careers and to solve problems in human group relations. Applied sociology is good training for a wide variety of careers. It is useful for any job which involves work with people, organizations or communities. It is also good preparation for professional organizations or communities and for professional careers in local government, personnel relations, law, the clergy, business and management.

CURRICULA

The degree of Bachelor of Science with a major in applied sociology is offered by the College of Agriculture and Life Sciences. In addition to topics in agricultural and community sociology, majors in this department have the option of concentrating in criminal justice.

CURRICULUM IN APPLIED SOCIOLOGY

Degree earned: B.S. in Applied Sociology

FRESHMAN YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
ALS 103 Intro. Topics in ALS	1	CH 100 Chemistry & Society *or*	
BIO 105 Biology in Modern World *or*		CH 101 General Chemistry I *and*	
BIO 125 General Biology	4	CH 102 General Chemistry I Lab	4
ENG 111 Comp. & Rhetoric	3	ENG 112 Comp. & Reading	3
MA 107 PreCalculus I	3	MA 131 Analytic Geom. & Calculus A	3
Any 100-level PE in Fitness & Wellness[1]	1	SOC 241 Soc. of Agric. & Rural Society	3
SOC 202 Prin. of Sociology	3	Free Elective	3
	15		**16**

SOPHOMORE YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
CSC 200 Intro. to Computers *or*		ANT 252 Cultural Anthropology[12]	3
Computer Science Elective	3	ARE 201 Intro. Agric. & Res. Economics *or*	
GN 301 Genetics in Human Behavior	3	EC 201 Intro. to Economics I	3
SOC 301 Human Behavior	3	PS 201 Intro. to American Govt. *or*	
ST 311 Intro. to Statics	3	PS 202 State & Local Govt.	3
English, Comm. or Foreign Lang. Elective[3]	3	PY 131 Conceptual Physics	4
Physical Education Elective[1]	1	Literature Elective[4]	3
	16		**16**

JUNIOR YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
SOC 300 Social Research Methods	4	ANT 251 Physical Anthropology	3
SOC 311 Community Relationships	3	SOC 400 Theories of Social Structure *or*	
History Elective[5]	3	SOC 401 Theories of Social Interaction	3
Restricted SOC Elective (300+)[6]	3	Mathematical or Natural Science Elective[7]	3
Free Elective	3	Phil, Relig, Vis/Perf. Arts[8]	3
	16	Free Elective	3
			15

SENIOR YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
SOC 351 Population and Planning	3	SOC 492 or 493 Field Work in Appl. Soc.	3
SOC 410 Soc. of Organization	3	Elective (A,B,C, or Hum. & Social Science)[9]	7
Humanities/Social Science. Electives[2]	6	Restricted SOC Elective (400+)[10]	3
Free Elective	3	Science, Technology & Soc. Elective[11]	3
	15		**16**

Minimum Hours Required for Graduation: 125

Note: Foreign Language proficiency at the FL_102 level is required to be eligible for graduation.
[1]Two semester hours of Physical Education (PE) credit are required for graduation.
[2]This course must be selected from the Humanities and Social Sciences List of the NC State General Education Lists of Electives.
[3]This course must be selected from either the English List, the Communication List or the Foreign Language List included in the NC State General Education Lists of Electives.
[4]This course must be selected from the Humanities Literature List of the NC State General Education Lists of Electives.
[5]This course must be selected from the History List of the NC State General Education Lists of Electives.
[6]Any 300 level Sociology course other than a required course will fulfill this requirement.
[7]This elective course must be selected from either the Mathematical Sciences List or either of the Natural Sciences List included in the NC State General Education Lists of Electives.
[8]This elective course must be selected from either the Philosophy List, the Religion List or the Visual and Performing Arts List of the NC State General Education Lists of Electives.
[9]This course may be chosen from the CALS category A, B, C, list shown in the Catalog or the Humanities and Social Sciences List in the NC State General Education Lists of Electives.
[10]Any 400 level Sociology course other than a required course will fulfill this requirement.
[11]This elective course must be selected from one of the Perspectives Lists within the Science Technology and Society Lists of the NC State General Education Lists of Electives.
[12]ANT 252 meets the non-English speaking culture requirement.

CURRICULUM IN APPLIED SOCIOLOGY, CRIMINAL JUSTICE CONCENTRATION
Degree earned: B.S. in Applied Sociology

FRESHMAN YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
ALS 103 Intro. Topics in ALS	1	CH 100 Chemistry & Society *or*	
BIO 105 Biology in Modern World *or*		CH 101 General Chemistry I *and*	
BIO 125 General Biology	4	CH 102 General Chemistry I Lab	4
ENG 111 Comp. & Rhetoric	3	ENG 112 Comp. & Reading	3
MA 107 PreCalculus I	3	MA 131 Analytic Geom. & Calculus A	3
Any 100-level PE in Fitness & Wellness[1]	1	PS 201 Intro. to American Govt.	3
SOC 202 Prin. of Sociology	3	SOC 241 Soc. of Agric. & Rural Society	3
	15		**16**

SOPHOMORE YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
CSC 200 Intro. to Computers or		ANT 252 Cultural Anthropology[13]	3
Computer Science Elective	3	ARE 201 Intro. Agric. & Res. Economics or	
GN 301 Genetics in Human Behavior	3	EC 201 Intro. to Economics I	3
SOC 306 Criminology	3	PS 311 Criminal Justice Policy Process	3
ST 311 Intro. to Statics	3	PY 131 Conceptual Physics	4
English, Comm. or Foreign Lang. Elective[2]	3	Literature Elective[3]	3
Physical Education Elective[1]	1		**16**
	16		

JUNIOR YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
ANT 251 Physical Anthropology	3	SOC 400 Theories of Social Structure or	
SOC 300 Social Research Methods	4	SOC 401 Theories of Social Interaction	3
SOC 301 Human Behavior	3	Criminal Justice (SOC) Elective[6]	3
History Elective[4]	3	Mathematical or Natural Science Elective[7]	3
Philo., Relig., Vis/Perf. Arts Elective[5]	3	Restricted Sociology Elective (300+)[8]	3
	16	Free Elective	3
			15

SENIOR YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
SOC 351 Population and Planning	3	SOC 413 Criminal Justice Fieldwork	4
Criminal Justice (PS) Elective[9]	3	Criminal Justice (SOC) Elective[6]	3
Criminal Justice (SOC) Elective[6]	3	Humanities/Social Science. Electives[10]	3
Humanities/Social Science. Electives[10]	3	Restricted SOC Elective (400+)[11]	3
Free Elective	3	Science, Technology & Soc. Elective[12]	3
	15		**16**

Minimum Hours Required for Graduation: 125

Note: Foreign Language proficiency at the FL 102 level is required to be eligible for graduation.
[1]Two semester hours of Physical Education (PE) credit are required for graduation.
[2]This course must be selected from either the English List, the Communication List or the Foreign Language List included in the NC State General Education Lists of Electives.
[3]This course must be selected from the Literature List of the NC State General Education Lists of Electives.
[4]This course must be selected from the History List of the NC State General Education Lists of Electives.
[5]This course must be selected from either the Philosophy List, the Religion List or the Visual and Performing Arts List of the NC State General Education Lists of Electives.

[6]This course must be selected from the Sociology-Criminal Justice Course List which includes SOC 425, SOC 427, SOC 428, SOC 429, SOC 430, SOC 515, SOC 516.
[7]This course must be selected from either the Mathematical Sciences List or either of the Natural Sciences Lists included in the NC State General Education Lists of Electives.
[8]Any 300 level Sociology course other than a required course will fulfill this requirement.
[9]This course must be selected from the Political Science-Criminal Justice Course List which includes PS 306, PS 307, PS 415, PS 445, PS 506, PS 517.
[10]This course must be selected from the Humanities and Social Sciences List of the NC State General Education Lists of Electives.
[11]Any 400 level Sociology course other than a required course will fulfill this requirement.
[12]This elective course must be selected form one of the Perspectives Lists within the Science Technology and Society Lists of the NC State General Education Lists of Electives.
[13]ANT 252 meets the non-English speaking culture requirement.

DEPARTMENT OF SOIL SCIENCE

www.soil.ncsu.edu

Williams Hall, Room 2234
Phone: (919) 515-2655

J. L. Havlin, *Head*
C. D. Raper Jr., *Director of Graduate Programs*
S. C. Hodges, *Department Extension Leader*
H. J. Kleiss, *Undergraduate Program Coordinator*

Alumni Distinguished Graduate Professor: S. W. Buol; *William Neal Reynolds Professors:* S. W. Buol, J. W. Gilliam; *Professors:* A. Amoozegar, S. W. Broome, D. K. Cassel, F. R. Cox, S. C. Hodges, M. T. Hoover, G. D. Hoyt, D. W. Israel (USDA), L. D. King, H. J. Kleiss, G. S. Miner, C. D. Raper Jr., M. J. Vepraskas, R. J. Volk, M.G. Wagger, A. G. Wollum, J. P. Zublena; *Adjunct Professors:* P. G. Hunt, R. J. McCracken; *Professors Emeriti:* J. V. Baird, W. V. Bartholomew, M. G. Cook, G. A. Cummings, R. W. Cummings, J. W. Fitts, W. A. Jackson, E. J. Kamprath, C. B. McCants, J. A. Phillips, P. A. Sanchez, S. B. Weed; *Associate Professors:* R. A. McLaughlin, R. L. Mikkelsen, G. C. Naderman, T. J. Smyth, *Adjunct Associate Professor:* M. R. Tucker, *Associate Professors Emeriti:* J. P. Lilly, R. E. McCollum, J. E. Shelton, *Assistant Professors:* D. A. Crouse, C. R. Crozier, D. L. Hesterberg, D. L. Lindbo, D. Osmond, J. Rideout; *Adjunct Assistant Professors:* C. A. Ditzler, B. D. Hudson, B. F. McQuaid, *Assistant Professor Emeritus:* C. K. Martin; *Senior Researcher:* W. P. Robarge, *Associate Members of the Faculty:* H. L. Allen, L. T. Henry, R. Lea (Forestry); S. R. Shafer (Plant Pathology); R. W. Skaggs (Biological and Agricultural Engineering); G.F. Peedin, J.B. Weber (Crop Science).

The Department of Soil Science trains students in fundamentals of soils, develops an understanding and appreciation of soils as a resource, and presents principles of soil management and utilization for both farm and non-agricultural purposes. Soils constitute one of the largest capital investments in farming, and proper soil management is essential for efficient production. Future world food needs will require people conversant in soil resources and use of fertilizers. Soil properties are important consideration in urban-suburban planning and development. Also, knowledge of soil and its interaction with potential pollutants is essential in maintaining environmental quality. Therefore, the demand for people trained in soils by private consultants, agribusiness, research, service planning-development, education and conservation-related agencies should continue to be great.

OPPORTUNITIES

Soil science graduates fill positions of leadership and service in land resource planning, conservation, natural resource management and agriculture. Among these are opportunities as farm operators and managers, county agricultural extension agents and employees of other public advisory agencies, Natural Resources Conservation Service and other conservation-related agencies concerned with soil resources. Graduates also serve as technical representatives and salesmen in fertilizer companies and in other agribusiness activities. Many opportunities exist for private consulting soil scientists who serve a variety of clientele needs. Environmental concerns usually require soil science expertise, especially in land-based waste management. Provision is made for students wishing a more thorough training in biological sciences, chemistry, mathematics and physics leading to graduate study. (See the Graduate Catalog for a listing of graduate degrees.) Students with an advanced degree have wide opportunities in teaching, research, service and extension with state, federal and private educational and research institutions and agencies.

CURRICULA

The Bachelor of Science degree may be obtained with major in agronomy, natural resources or environmental sciences. The agronomy program is administered jointly with the Crop Science Department. A soil science concentration is available in the agronomy curriculum. Two soils concentrations are available in the natural resources curriculum, soil resources and soil and water resource systems. An environmental soil science concentration is available in the environmental sciences curriculum. *(The agronomy, natural resources, and environmental sciences curricula are shown earlier under College of Agriculture and Life Sciences.)*

MINOR IN SOIL SCIENCE

The academic minor in soil science is offered to students desiring a strong knowledge of the principles of soil science to complement their major. It is intended to strengthen the understanding of basic physical and chemical soil properties that would be relevant to a student's particular land management interest. These interests may include but are not limited to conservation, forestry, geology, landscape architecture, horticulture, biological and agricultural engineering, agricultural business management, or agricultural education. Fourteen hours of required courses and three hours of electives are necessary to complete the minor.

DEPARTMENT OF TOXICOLOGY

www.cals.ncsu.edu/toxicology/index.htm

Method Unit IV
Phone: (919) 515-2274

G.W. Winston, *Head*
G.A. LeBlanc, *Director of Graduate Programs*

William Neal Reynolds Professor: E. Hodgson; *Professosr:* R.B. Leidy, R.C. Smart; *Adjunct Professors:* J.A. Goldstein, R.J. Langenbach, R.O. McClellan, R.M. Philpot, R.J. Preston; *Professor Emeritus:* T. J. Sheets; *Associate Professors:* G.A. LeBlanc, D. Shea; *Adjunct Associate Professors:* A. E. Chalmers, N. Chernoff, K. M. Crofton, T. E. Eling, H. B. Matthews, L. Recio; *Assistant Professors:* S. Branch, W.G. Cope; *Visiting Assistant Professor:* R.L. Rose; *Research Assistant Professor:* S. A. Meyer; *Agromedicine Information Specialist:* J.F. Storm; *Associate Members of the Faculty:* K. B. Adler (Veterinary Medicine), A. L. Aronson (Veterinary Medicine), C. F. Brownie (Veterinary Medicine), J. M. Cullen (Veterinary Medicine), W. J. Fleming (Zoology), H. M.

Hassan (Biochemistry, Food Science, Microbiology), W. W. Heck (Botany), J.M. Horowitz (Veterinary Medicine), R. J. Kuhr (Entomology), M. Law (Veterinary Medicine), R. J. Linderman (Chemistry), W. H. McKenzie (Genetics), N. A. Monteiro-Riviere (Veterinary Medicine), M. A. Qureshi (Microbiology, Poultry Science), J. E. Riviere (Veterinary Medicine), C. L. Robinette (Veterinary Medicine), R. M. Roe (Entomology), I.W. Smoak (Veterinary Medicine), M. Stoskopf (Veterinary Medicine).

The Department of Toxicology offers courses of study leading to the Master of Toxicology, Master of Science and Doctor of Philosophy degrees. The Department of Toxicology trains qualified individuals to conduct basic and applied scientific research on the mechanisms of chemically induced toxicity, to advance toxicology as a science and to communicate concepts of toxicology.

DEPARTMENT OF ZOOLOGY

www.cals.ncsu.edu.zoology

D. Clark Labs, Room 115
Phone: (919) 515-2741

T.L. Grove, *Head*
J.F. Gilliam, *Undergraduate Coordinator*
B.J. Copeland, *Director of Graduate Programs*

Alumni Distinguished Undergraduate Professors: G.T. Barthalmus, J.F. Roberts; *Professors:* B.L. Black, P.T. Bromley, B.J. Copeland, P.D. Doerr, J.F. Gilliam, W.C. Grant, R.M. Grossfeld, T.L. Grove, H.F. Heatwole, T.M. Losordo, C.F. Lytle, J.M. Miller, R.L. Noble, J.A. Rice, C.V. Sullivan, H.A. Underwood, J.G. Vandenbergh; *Adjunct Profassors:* F.A. Cross, L.B. Crowder, D.E. Hoss, G.R. Huntsman, P.H. Kelley, G.W. Thayer, J.R. Walters; *Professors Emeriti:* P.C. Bradbury, W.W. Hassler, M.T. Huish, G.C. Miller, T.L. Quay, J.F. Roberts, D.E. Smith; *Associate Professars:* R.H. Anholt, J.A. Collazo (USDI), J.E. Hightower (USDI), J.M. Hinshaw, R.G. Hodson, S.C. Mozley, M. Niedzlek-Feaver, R.A. Powell, T.R. Simons (USDI); *Adjunct Associate Professors:* W.J. Fleming, C.S. Manooch, R.M. Shelley, H.W. van der Veer; *Assistant Professors:* R.J. Borski, H.V. Daniels, J.R. Godwin, N.M. Haddad, P.S. Rand; *Adjunct Assistant Professors:* B. Bennett, A.B. Bogan, S.V. Chiavetta, R.J. Kavlock, R.W. Laney, M.R. Meador, W.E. Palmer, W.C. Starnes; *Adjunct Instructors:* A.L. Braswell, R.B. Hamilton; *Associate Members of the Faculty:* E.J. Jones (Extension Forest Resources), R.A. Lancia (Forest Resources), K.H. Pollock, T.G. Wolcott (Engineering and Marine, Earth and Atmospheric Sciences).

The Department of Zoology provides undergraduate and graduate instruction in specialized biological sciences areas. Undergraduates study all levels of biological organization from the molecular to the community. Zoology majors are well prepared for graduate work in zoology and related fields of sciences. (See the Graduate Catalog for a listing of graduate degrees.) Participation in supervised programs of research is strongly encouraged. A strong science background is provided for students planning to enter dentistry, medicine, optometry, veterinary medicine and allied health sciences, such as medical technology, physical therapy and physician assistant. Ecology, including wildlife, fisheries, behavioral ecology and marine biology, is a strong area. Cellular and molecular biology, including reproductive endocrinology and neurobiology, also are emphasized.

OPPORTUNITIES

Bachelor of Science graduates in zoology have many career options. Graduates are well prepared for employment in various government agencies or private industries. Graduates may continue their education with studies leading to advanced degrees in many areas of biological sciences such as zoology, cell biology, wildlife and fisheries science, marine science and biomedical subdisciplines. Many also choose to seek degrees in medicine, dentistry, veterinary medicine and other health-related areas.

CURRICULA

The Bachelor of Science degree with a major in zoology or fisheries and wildlife sciences is offered under the science curriculum of the College of Agriculture and Life Sciences. Within these majors a student may specialize depending upon interest and ability.

The zoology curriculum (SZO) prepares students for graduate school, medical, dental or optometry school (SZO/SDM), and for veterinary schools (SZO/SPV). Certain professional schools have specific requirements which differ slightly from the zoology curriculum. Students should consult catalogs of specific professional schools to ensure completion of any special requirements.

Other curricula include the fisheries (SFF) and wildlife (SFW) sciences program and the environmental science program in ecology (ESC)and the medical technology program (SZM). Students are advised by faculty in their special areas of interest.

MINOR IN ZOOLOGY

A minor in zoology is available to all baccalaureate students at NC State University, except majors in other curricula within the Zoology Department (Biological Sciences, Fisheries and Wildlife Science, Medical Technology, and Environmental Science—Ecology Concentration [ESC]). This minor will be useful to students applying to professional schools such as medicine, dentistry, veterinary medicine, and other health sciences. Basic knowledge in animal biology may also be useful to students seeking careers in government, industry, or education. The minor consists of a minimum of 15-16 credit hours, including three- or four-credit zoology course (including courses cross-listed with zoology) at the 300- or 400-level.

* Grade of C or better is required.

CURRICULUM IN ZOOLOGY

Degree earned: B.S. in Zoology

FRESHMAN YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
ZO 150 Animal Diversity[5]	4	ZO 160 Intro. to Cell and Dvlpmntl Zoology[5]	4
MA 107 PreCalculus I	3	CH 101 Chemistry- A Molecular Science	3
ENG 111 Comp. & Rhetoric	3	CH 102 General Chemistry Lab	1
Humanities/Social Science. Elective[3]	3	ENG 112 Comp. & Reading	
ALS 103 Intro. Topics in ALS	1	MA 131 Calculus for Life and Mgmt. Science A	3
Any 100-level PE in Fitness & Wellness[7]	1	Physical Education Elective[7]	1
	15		**15**

SOPHOMORE YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
ZO 250 Animal Anatomy and Physiology[5]	4	ZO 260 Evolution, Behavior and Ecology[5]	4
CH 221Organic Chemistry I	4	CH 223 Organic Chemistry II	4
CSC 200 Intro. Computer & Uses	3	Restricted Elective[4]	3
Humanities/Social Science. Elective[3]	3	Humanities/Social Science. Electives[3]	6
COM Elective[2]	3		17
	17		

JUNIOR YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
Zoology Elective[6]	4	Zoology Elective[6]	3
CH 201 - Chemistry - A Quantitative Science	3	PY 212 College Physics II	4
CH 202 - Quantitative Chemistry Lab	1	GN 411 Prin. of Genetics	4
PY 211 College Physics I	4	Restricted Elective[4]	3
English Elective[1]	3	Humanities/Social Science Elective[3]	3
	15		17

SENIOR YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
Zoology Electives[6]	6	Zoology Elective[6]	3
Restricted Elective[4]	4	Restricted Elective[4]	3
Humanities/Social Science. Elective[3]	3	Humanities/Social Science. Elective[3]	3
Free Elective[8]	3	Free Electives[8]	6
	16		15

Minimum Hours Required for Graduation: 127

[1]Choose from ENG 333 Communication for Science and Research (preferred) or English Literature or ENG 331 or ENG 332.
[2]Choose one course from COM 110 Public Speaking, COM 112 Interpersonal Communication, COM 146 Business and Professional Communication or COM 211 Argumentation and Advocacy.
[3]Among 21 credits of Humanities & Soc. Science (HSS), the student must take one history; oneliterature; one course in philosophy, religion or visual/performing arts; two courses from psychology, politics, economics (recommended), government, sociology, anthropology or cultural geography; one course from the Science, Technology and Society List - from the Humanities/Social Science Perspective; one additional course from any approved HSS lists. One of these seven courses must focus on a non-English Speaking Culture. Important Note: The list of approved HSS courses is updated periodicallyFor the most current list check GER web page: **www2.ncsu.edu/ncsu/provost/info/academic_programs/ger/index.html**
[4]Your choice of 13 hours from courses listed in the Undergraduate Catalog, College of Agriculture & Life Sciences Group A (Physical and Biological Science). Recommended are any zoology, fisheries and wildlife, botany, microbiology, biochemistry, mathematics, and statistics courses. Up to 3 hours of ZO 492 or ZO 493 or ZO 624 or ALS 498 or ALS 499 can be used toward the 13 hours. MA 132 (1 credit) is specifically recommended. Select these on the basis of your interests and career goals. Preveterinary second majors (SPV) must take ST 311, MB 351, BCH 451 and one course in nutrition (ANS 230 or ANS 415). Preoptometry second majors (SDM) must take MB 351. A second calculus (e.g. MA 231) is required by some medical schools.
[5]ZO 150, ZO 160, ZO 250, ZO 260 (grade"C" minimum) are required. Either ZO 150 or ZO 160 may be taken first. ZO 260 may be taken after receiving "C" or better in ZO 150 and ZO 250 can be taken after receiving a "C" or better in both ZO 150 and ZO 160.
[6]Total departmental electives must equal at least 16 credit hours. Choose from any zoology courses at the 300-level or higher, including cross-listed courses from other departments and up to 3 hours of ZO 492 or ZO 493 or ZO 624. MEA/ZO 220 can also be used to meet this 16-hour requirement.
[7]Total departmental electives must equal at least 16 credit hours. Choose from any zoology courses at the 300-level or higher, including cross-listed courses from other departments and up to 3 hours of ZO 492 or ZO 493 or ZO 634 or ALS 498 or ALS 499. ZO 212 cannot be used to meet these 16 hours of departmental electives, but can be used as a Restricted Elective (Footnote 4, above).
[8]These electives must not be remedial, nor taken at an elementary level after you have taken comparable course work at an advanced level nor should they contain substantial amounts of material or themes presented in a previous course.

NORTH CAROLINA AGRICULTURAL RESEARCH SERVICE

Patterson Hall, Room 100

D. F. Bateman, *Dean,* College of Agriculture and Life Sciences
J. C. Wynne, *Associate Dean,* College of Agriculture and Life Sciences, and Director,
N.C.Agricultural Research Service G. J. Kriz, *Associate Director,* N.C. Agricultural Research Service
E. Young, *Assistant Director,* N.C. Agricultural Research Service
S. A. Lommel, *Assistant Director,* N.C. Agricultural Research Service
W. K. Collins, *Coordinator,* Tobacco Programs, N.C.Agricultural Research Service
J. H. Britt, *Assistant Director,* N.C.Agricultural Research Service, *Associate Dean,* College of Veterinary Medicine
J. B. Jett, *Assistant Director,* N.C.Agricultural Research Service and *Associate Dean,* College of Forest Resources
H. Shaw, *Assistant Director,* N.C.Agricultural Research Service, and *Dean,* School of Human Environmental Sciences, University of N.C. at Greensboro

The North Carolina Agricultural Research Service is the agricultural, life sciences, forestry, and home economics research agency of the State of North Carolina. It is funded principally by appropriations from the North Carolina General Assembly, federal formula funds, grants and contracts.

The N.C. Agricultural Research Service provides the following public services:

- conducts research on the development and maintenance of an effective agricultural and forestry industry in North Carolina, including economically sound sources of supplies and equipment needed in agriculture and forestry and market outlets for the products of agriculture and forestry;
- improves rural homes, rural life and rural environment;
- maintains a reliable supply of agricultural and forestry products for the consuming public. This requires research to solve current problems and research to provide a foundation of scientific knowledge in the biological, physical and social sciences. The N.C. Agricultural Research Service faculty brings well-trained personnel to the university whose teaching in many specialized fields of agriculture, biology and the social sciences assures the maintenance of curricula of high standards. It contributes to the advanced training of students who are destined to become the leaders, teachers and investigators necessary in the maintenance of a viable agriculture and forestry industry.

PUBLICATIONS
The N.C. Agricultural Research Service publishes bulletins and scientific papers on research conducted by the staff. Copies of bulletins may be obtained from the Department of Agricultural Communications and scientific papers from authors.

SERVICES
The faculty of the N.C. Agricultural Research Service conduct original and other research bearing directly on and contributing to the establishment and maintenance of permanent and effective agricultural and forestry industries in North Carolina. This research includes field and laboratory experimentation in the biological, physical, social, and environmental sciences. Primary emphasis is given to the production, processing, distribution, and consumption of the many agricultural and forestry commodities produced throughout the state. Also, major attention is given to research programs aimed at improving the quality of life of both rural and urban peoples.

COOPERATIVE EXTENSION SERVICE
Ricks Hall, Room 104

D. F. Bateman, *Dean,* College of Agriculture and Life Sciences
B. E. Caldwell, *Interim Director,* Cooperative Extension Service
R. E. Phillips, *Associate Directar,* Cooperative Extension Service
M. A. Corbin, *Assistant Director,* Home Economics
R. G. Crickenberger, *Interim Assistant Director,* ANR - CRD
M. A. Davis, *Interim Assistant Director,* 4-H and Youth
E. M. Prosise, *Interim Assistant Director,* County Operations
R. W. Shearon, *Assistant Director,* Program Staff and Organizational Development

The Cooperative Extension Service of North Carolina State University is a cooperative undertaking among the United States Department of Agriculture, the State of North Carolina, the 100 counties in the state and the Cherokee Indian Reservation. Its work is supported by federal funds made available under the Smith-Lever Act of 1914, as amended by state and county appropriations, and by grants and contracts.

The federal and state appropriations are used to maintain an administrative and specialist staff and to pay a portion of the salary and the travel expenses of the county extension agents. Under this cooperative arrangement, the Cooperative Extension Service serves as the "educational arm" of the United States Department of Agriculture and as the "field faculty" of North Carolina State University in the areas of agriculture and natural resources, family living, 4-H and youth, and community and rural development.

The primary purpose of the North Carolina Cooperative Extension Service is to provide the people of the state with the latest and best information--particularly that which is related to agriculture and natural resources, home economics and youth, and rural development--and help them to interpret and use this information in building a more prosperous and satisfying life.

This program has sufficient flexibility to permit special attention to the problems, needs and interests of the people in each county. County Advisory Councils are utilized to determine and prioritize the county educational program content. Assistance is given to individuals, families, communities, agricultural and seafood processing and marketing firms, other businesses and certain organizations. This includes work with adults and youth in both the city and rural areas.

In carrying out this educational program, a variety of methods and techniques are employed: method and result demonstrations; meetings; visits to farms, homes and businesses; organized groups of men, women and youth; tours; leaflets, pamphlets and other printed materials and mass media.
The basic sources of information to be taught through this educational program are the findings and recommendations resulting from research conducted by the Agricultural Research Service in this and other states and by the United States Department of Agriculture.

AGRICULTURAL INSTITUTE
Patterson Hall, Room 107

D. F. Bateman, *Dean,* College of Agriculture and Life Sciences
J. L. Oblinger, *Associate Dean,* College of Agriculture and Life Sciences, and *Director,* Academic Programs
J.C. Cornwell, *Director* and *Assistant Dean* of Academic Affairs

The Agricultural Institute is a two-year academic program which awards the Associate in Applied Science Degree upon successful completion of at least one of eight curricula. The Agricultural Institute provides education and training in food, pest control, agriculture, horticulture, turfgrass management and agribusiness. It is part of the academic programs in the College of Agriculture and Life Sciences at North Carolina State University. Provision for the Agricultural Institute was made by the 1959 North Carolina General Assembly and instruction began in the Fall, 1960. The objective of the Agricultural Institute is to provide technical training for those desiring a comprehensive education in the food and agricultural sciences, agribusiness and related areas.

The instructional programs of the Agricultural Institute are organized and conducted as part of the overall academic program in the College of Agriculture and Life Sciences. The Agricultural Institute is an addition to, and not a substitute for, the college's regular degree-granting program. The Agricultural Institute uses the same facilities (classrooms, laboratories, farms) as the four-year program. The facilities are used extensively for both teaching and observing the application of technology in agriculture and other closely related areas.

The faculty of the four-year program are responsible for organizing and teaching courses offered by the Agricultural Institute. Emphasis is placed on practical knowledge and training, with many courses requiring laboratories using hands-on experience. The Agricultural Institute offers majors in eight areas: Agribusiness Management; Agricultural Pest Control; Field Crops Technology; Food Processing, Distribution and Service; General Agriculture; Livestock Management and Technology; Ornamentals and Landscape Technology; and Turfgrass Management.

OPPORTUNITIES

Rapid technical advancement has been important in changing agriculture from a small production industry to the nation's largest industry. Closely associated with production agriculture are those areas related to recreation and beautification such as turfgrass management, landscaping and ornamental plants. Increased production and consumer demand for convenience-type foods have stimulated the food processing industry, in turn increasing food distribution requirements.

Today's complex agriculture requires a large work force. This work force must have some technical training and be able to deal with a vast array of problems and opportunities. Graduates of the Agricultural Institute have the education and training that is in demand by the food and agricultural industries and that permit them to assume responsible positions in the agriculture and allied fields. Some career examples include farm and herd managers, golf course superintendents, nursery managers, pest control specialists, quality control technicians, food service supervisors, sales and service of agricultural equipment and products, food inspectors, lawn care specialists and others. More job opportunities than graduates make salaries attractive and competitive.
The College of Agriculture and Life Sciences maintains a Career Services Office to assist graduates in addressing resume construction, interviewing strategies, successful job search techniques, location of summer internships, and job market trends.

ENTRANCE REQUIREMENTS

Any individual who has received a diploma from an accredited high school or has passed the high school equivalency examination administered by the Department of Community Colleges is eligible for admission consideration. Each application will be reviewed and evaluated by the Director of the Agricultural Institute.

For additional information write: Director, Agricultural Institute, Box 7642, 107 Patterson Hall, North Carolina State University, Raleigh, NC 27695-7642, Telephone (919) 515-3248. The World Wide Web site is located at: http://www2. ncsu.edu/ncsu/cals/agi.

PROGRAMS OF STUDY

Graduates of the Agricultural Institute are awarded the Associate in Applied Science degree. The eight programs of study are Agribusiness Management; Agricultural Pest Control; Field Crops Technology; Ornamentals and Landscape Technology; Food Processing, Distribution, and Service; General Agriculture; Livestock Management and Technology (general livestock option, poultry option, and swine option); Turfgrass Management.

SCHOOL OF DESIGN

200 Brooks Hall
NCSU Box 7701
Raleigh, NC 27695-7701

Phone: (919)515-8310
Fax: (919)515-7330
Internet E-mail: sodwebpoge@ncsu.edu
Visit the School of Design at: http:// www.design.ncsu.edu

Marvin J. Malecha, *Dean*
John Tector, *Associate Dean for Undergraduate Studies and Academic Affairs*
Martha Scotford, *Associate Dean for Graduate Studies, Research, Outreach and Extension*
William K. Bayley, *Director, Multi-Media Laboratory*
Caroline Carlton, *Librarian, Design Library*
Chris Jordan, *Director, Facilities and Materials Laboratory*
Marva Motley, *Director of Student Affairs*

Now in its fifth decade, the School of Design at North Carolina State University has concerned itself from the beginning with preparing designers who, in the broadest sense, shape the world. Design education is more than an attempt to teach a set of technical skills. The environment-including the spaces in which people live and work, the products they consume, and the messages they receive-have a powerful impact on how humans function as a society. Good design, therefore, requires attention and sensitivity to social, economic, political, cultural, and behavioral issues. The aim of all design curricula in the School of Design is to develop the designer's perception, knowledge, skills, and problem-solving abilities.

The School of Design admits students through a selective process that ensures a highly motivated and heterogeneous design community. The entering student body consistently ranks at the top of academic achievement in the university and the School's graduation rates are the highest in the institution. While providing undergraduate and graduate study in multiple disciplines and encouraging individual plans of study, the School functions as a unified, interactive education center, dedicated to preparing designers capable of shaping the environment to various scales, but always in response to society's needs.

DESIGN FUNDAMENTALS - The First Year Experience

All students entering the School of Design are admitted directly into Design Fundamentals and only enter the specific major after the second semester of that common experience. The first year experience consists of a common two semester studio course sequence. Each semester studio earns 6 credit hours and meets 9 hours per week. The work outside the class is

substantial and is largely carried out in the same communal studio space with students working both independently and in collaboration to solve the problems posed in the class. Most class time is spent in either hands-on work, discussion, demonstration, critique, or field trips. Emphasis is on interaction, independence, self-discipline, and self motivation.

The first semester studio (DF 101) focuses on the basic vocabulary and skills common to all designers in all disciplines. This includes the basics of composition, an awareness of the impact of design on culture and the environment, and mastery of basic hand skills with materials and tools. Design process is discussed and practiced so that students learn the value of generating alternative solutions before refining and producing them. Weekly "orientation" lectures provide pertinent topical information and expose students to a variety of faculty and ideas in the School.

The second semester studio (DF 102) focuses on the application of the basic information learned in the first semester to problems that are typical of the professions represented by current school curricula-architecture, landscape architecture, graphic design, industrial design (including textile design) and art and design (including the fine arts of painting, drawing, sculpture, illustration, photography, printmaking and the fiber arts). Projects involve working at a variety of scales-from small hand-held objects to outdoor installations. This second semester is designed to give students basic exposure to the essential concerns of each discipline, as well as to assist them in making a choice for later study.

In both semesters, the fundamentals experience emphasizes learning to use the design process, establishing disciplined working habits, talking about the work to others (communication with the language learned in the class), and working in collaboration with others, thus forming the foundation of all subsequent design work in the School and in the design professions.

CURRICULA AND DEGREES

The School of Design offers undergraduate instruction leading to the four-year Bachelor of Environmental Design in Architecture, Bachelor of Art and Design, Bachelor of Industrial Design, and Bachelor of Graphic Design, as well as five-year degree programs leading to the Bachelor of Architecture and the Bachelor of Landscape Architecture. The General Education component of each curriculum consists of courses in mathematical and natural sciences, writing and speaking, foreign language, humanities and social sciences, physical education, science/technology/society, and communication and information technology. In addition to six-credit design studios where students apply their expanding knowledge and skills to theoretical and practical design problems, majors in the School of Design take support courses dealing with design knowledge and skills, such as communication and presentation, human behavior, environment, history, philosophy, physical elements and systems, methods and management.

After a common Design Fundamentals program in the first year, students select a disciplinary major. The curriculum path is flexible, affording students the opportunity to concentrate in one area while making contact with the other design disciplines. In addition to their faculty mentors, students are exposed to a broad range of design professionals through guest lectures, juries, projects and workshops. Graduate studies are designed for students who want to build on undergraduate education and professional experience, as well as for those who come from non-design backgrounds and want to pursue advanced design degrees. The school offers graduate study in the Master of Architecture, Master of Graphic Design, Master of Industrial Design, and Master of Landscape Architecture programs. (Please refer to the NC State University Graduate Catalog for curriculum information on Master's programs in the School of Design.)

DaVINCI SCHOLARS PROGRAM

This joint program between the School of Design and the College of Humanities and Social Sciences allows students to earn two undergraduate degrees within five or six years: a bachelor's degree in one of the five undergraduate disciplines in the School of Design and a B.A. or B.S. degree in the College of Humanities and Social Sciences.

The primary purpose of the double degree is to provide students with a strong liberal education as a complement to their professional interests in design. For example, students majoring in Graphic Design, with a second degree that focuses on writing, may improve their opportunities for employment in

communications. A student in Architecture with a second degree in history may improve opportunities for focused graduate study in architectural history, preservation, or urban planning. Study of foreign language may improve students' opportunities for international design practice.

DaVinci Scholars will earn their first degree in design with no adjustment in their design requirements. They will elect a second major from any of those available in the College of Humanities and Social Sciences, including a Multidisciplinary Studies major (admission to the MDS program requires a statement of intent and proposed interdepartmental curriculum that must be approved by the MDS Degree Committee.) Most students will complete their second degree within one additional year of study or two summer sessions plus one additional semester.

Students will be designated as DaVinci Scholars only during their first year of enrollment in the School of Design. To qualify for the DaVinci Scholars Program students must:

- present a minimum Dean's List GPA at the end of their first semester of study in the School of Design
- declare interest in the DaVinci Scholars Program in writing to the Associate Dean of the School of Design within their first year of study in the School of Design
- be selected by a review panel composed of three faculty in the School of Design and three faculty in the College of Humanities and Social Sciences and chaired by the Associate Dean in the School of Design

For more information, please contact the Associate Dean for Undergraduate Studies and Academic Affairs, School of Design, 200B Brooks Hall, Box 7701, NCSU, Raleigh, NC 27695-7701; (919) 515-8316.

MINOR IN DESIGN STUDIES (Non-Design Majors)

This minors' objectives are to provide a general orientation to the practice and theory of design for students whose primary study and employment will be in other disciplines, to clarify the role design plays in society, and to create informed consumers who are able to make intelligent decisions about communication, products and environments in work and in their personal lives.

Any undergraduate student in the university who is not majoring in a design discipline would benefit from this program. Any student seeking this minor should contact the Associate Dean for Undergraduate Studies in the School of Design for an application and assignment of a minor advisor.

DEPARTMENT OF ARCHITECTURE

www.design.ncsu.edu

Brooks Hall
Phone: (919) 515-8350

F.A. Rifki, *Head*
J. P. Rand, *Director of Graduate Programs*

Professors: P. Batchelor, G. Bizios, R. Burns, R. Clark, M. Malecha, W. Place, J.P. Rand, H. Sanoff, P. Tesar; *Associate Professors:* F. Harmon, F. Rifki, J. Tector; *Assistant Professors:* J. Amundson, W. Redfield, *Professor Emeritus:* J. Reuer, *Associate Professor Emeritus:* D. W. Barnes; *Visiting Professor Emeritus:* E.F. Harris, *Visiting Professors:* C. Bishir, N. Burns, R. Cannon, S. Cannon, E. Cassily, D. Dixon, K. Hobgood, T.C. Howard, J. Lee, J. Mann, W. H. McKinnon, G. Mibelli, S. Schuster, D. Stallings, E. Weinstein.

In a world of changing conditions - social-, cultural, economic and technological-the central task of the architect remains to give meaningful form to the physical environment. These rapid changes, however, force today's architects to not only concern themselves with traditional design issues like shelter, appropriateness, comfort and beauty but also to address emerging concerns like environmental conservation, rapidly expanding urban centers and towns, adaptive use and preservation of older buildings, providing built environments in a global market, and new means of producing architecture. The aesthetic revolution of the past few decades has also freed architects from the rigidity of earlier theory allowing greater diversity and expressiveness in architectural design.

The Department of Architecture has addressed the diversity of roles and responsibilities through its faculty and its curricula. Its distinguished faculty embraces a broad definition of the practice of architecture and is, therefore, free of a singular, dogmatic, or stylistic bias. This diversity is evident in their experience, area of interest, national origins, and educational backgrounds. The curriculum is designed to provide opportunities for students to encounter faculty in both classes and informal activities. The architecture curriculum balances professional studies with a broad general education. University requirements in mathematics, English, natural sciences and humanities are integrated with architectural design studios and a rich selection of design support courses. The design studio-a working laboratory in which the student under the guidance of a professor learns how to design buildings-is central to the curriculum.

The undergraduate Bachelor of Environmental Design in Architecture is a pre-professional degree that stresses the education of the individual and serves as the foundation for advanced, professional study in the discipline. The first year is spent on design fundamentals in studio common to all students in the School of Design. In the following years students receive a broad introduction to architectural design, theory, history, technology, and design processes while exploring educational opportunities within the university.

Following the pre-professional program students may continue their studies in either of two professional programs: the one-year, post-graduate Bachelor of Architecture or two-year Master of Architecture program (see the Graduate Catalog for information on the latter program). Entry into both of these programs is competitive. To be accepted students must demonstrate potential for professional accomplishment capability in design, and satisfy a specific set of professionally-oriented undergraduate requirements. Many students spend one or more years gaining professional experience in architecture firms or related fields before pursuing the advanced degrees. Educational enrichment is an important characteristic of the architectural program. The School of Design regularly presents public lectures by leading professionals and exhibitions of design and art work. Electives are available in related disciplines-painting, sculpture, photography, landscape architecture, industrial design, and graphic design. Also available are field trips to buildings in urban centers of architectural interest and a variety of foreign study programs.

OPPORTUNITIES

Graduates with the pre-professional Bachelor of Environmental Design in Architecture degree pursue careers in architectural offices, building construction, development, and public agencies. North Carolina and many other states have restricted professional licensing in architecture to holders of accredited professional degrees such as the Bachelor of Architecture and the Master of Architecture. This educational requirement must be followed by three years of professional internship and completion of a comprehensive examination to qualify for professional certification as an architect.

CURRICULUM IN ARCHITECTURE
Degree earned: Bachelor of Environmental Design in Architecture

FRESHMAN YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
ARC 141 History of Design I	3	ARC 142 History of Design II (list C5, required)	3
DF 101 Design Fundamentals Studio	6	DF 102 Design Fundamentals Studio	6
ENG 111 Comp. & Rhetoric	3	ENG 112 Composition & Reading	3
Mathematical Sciences Elective	3	Mathematical Sciences Elective	3
Fitness & Wellness Elective	1	Physical Education Elective	1
	16		**16**

SOPHOMORE YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
ARC 201 Architectural Design Studio: Environment	6	ARC 202: Architectural Design: Form	6
ARC 211 Natural Systems & Architecture	3	ARC 232 Structures & Materials	3
ARC 252 Design Methods in Architecture	3	ARC 261 The Discipline of Architecture	3
Natural Science Elective	4	Natural Science Elective	4
	16		**16**

JUNIOR YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
ARC 331 Architectural Structures I	3	ARC 302 Architectural Design: Technology	6
ARC 400 Architectural Design[2]	6	ARC 332 Architectural Structures II	3
Humanities Elective (list C.1-C.5)	3	ARC 441 History of Contemp. Architecture[3]	3
Writing/Speaking Elective (list B)	3	Social Sciences Elective (list D)	3
Social Sciences Elective (Env/Behav group)	3		**15**
	18		

SENIOR YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
ARC 400 Architectural Design[2]	6	ARC 402 Architectural Design: Integration	6
ARC 432 Architectural Construction Systems[3]	3	ARC 414 Environmental Control Systems	3
Adv. Humanities/Social Science (list E)	3	Science/Technology/Society Elective	3
Natural Science Elective	3	Humanities/Social Sciences	3
	15		**15**

Minimum Hours Required for Graduation: 127

[1]Courses to choose from are limited to: ANT 261; SOC 203, 220, 261; MDS 201,303.
[2]One of the two ARC 400 Architecture Studios may be substituted with another 400 level, 6 credit hour, design studio in another discipline in the school. No more than one studio may be taken in any semester.
[3] A major paper satisfying the G.E.R is required in this course.
* Foreign language proficiency at 101/102 levels are required for graduation but do not count toward the degree requirements.
* At least one of the elective courses must focus on a non-English speaking culture identified by asterisks in elective lists.
* The sequence of elective courses is illustrative only and not mandatory. Students may schedule elective courses in any order which supports their educational objectives.

CURRICULUM IN ARCHITECTURE - Fifth Year Professional Program
Degree earned: Bachelor of Architecture

FRESHMAN YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
ARC 141 History of Design I	3	ARC 142 History of Design II (list C5, required)	3
DF 101 Design Fundamentals Studio	6	DF 102 Design Fundamentals Studio	6
ENG 111 Comp. & Rhetoric	3	ENG 112 Comp. & Rhetoric	3
Math Elective (list A.1)	3	Mathematical Sciences Elective	3
Fitness & Wellness Elective	1	Physical Education Elective	1
	16		**16**

SOPHOMORE YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
ARC 201 Architectural Design Studio: Environment	6	ARC 202: Architectural Design: Form	6
ARC 211 Natural Systems & Architecture	3	ARC 232 Structures & Materials	3
ARC 252 Design Methods in Architecture	3	ARC 261 The Discipline of Architecture	3
Natural Science Elective	4	Natural Science Elective	4
	16		**16**

JUNIOR YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
ARC 331 Architectural Structures I	3	ARC 302 Architectural Design: Technology	6
ARC 400 Architectural Design Studio[2]	6	ARC 332 Architectural Structures II	3
Social Sciences Elective	3	ARC 441 History of Contemporary Architecture[3]	3
Writing/Speaking Elective	3	Adv. Humanities/Social Sciences Elective	3
Env/Behav Social Sciences Elective	3		**15**
	18		

SENIOR YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
ARC 400 Architectural Design[2]	6	ARC 402 Architectural Design: Integration	6
ARC 432 Architectural Construction Systems[3]	3	ARC 414 Environ. Control Systems	3
Adv. Humanities/Social Sciences	3	Science/Technology/Society Elective	3
Natural Science Elective (list A.1 or A.3)	3	Humanities/Social Sciences	3
	15		**15**

Minimum Hours Required for Graduation: 127

At the completion of four year study (127 credit hours) the Bachelor of Environment Design in Architecture is granted. An application to the Fifth Year is required. If accepted to the program students will follow this course of study:

FIFTH YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
ARC 501 Professional Architecture Studio I	6	ARC 502 Professional Architecture Studio II	6
ARC 581 Final Project Preparation	3	ARC 561 Practice of Architecture	3
Architecture Elective	3	Architecture Elective	3
Architecture Elective	3	Architecture Elective	3
	15		**15**

[1]One of the two ARC 400 Architecture Studios may be substituted with another 400 level, 6 credit hour, design studio in another discipline in the school. No more than one studio may be taken in any semester.
[2] A major paper satisfying the G.E.R is required in this course.
* Foreign language proficiency at 101/102 levels are required for graduation but do not count toward the degree requirements.
* At least one of the elective courses must focus on a non-English speaking culture identified by asterisks in elective lists.
* The sequence of elective courses is illustrative only and not mandatory. Students may schedule elective courses in any order which supports their educational objectives.

ART AND DESIGN PROGRAM

http://www.design.ncsu.edu

Leazar Hall
Phone: (919) 515-8315

C. Joyner, Program Director

Professors: C. Joyner, M. Pause, S. Brandeis; *Professors Emeriti:* G. L. Bireline, D. R. Stuart, W. Taylor; *Associate Professors:* C. Cox, L. M. Diaz, D. Raymond, S. Toplikar, C. Raub; *Assistant Professors:* P. Fitzgerald; *Visiting Associate Professor:* K. Rieder.

The Art and Design Program awards the Bachelor of Art and Design degree. The pedagogical core of the program aims to reinforce the foundation principles of design theory as applied to two- and three-dimensional design. Our curriculum addresses broad cultural, ecological, and societal considerations and promotes in our graduates the ability to meet the challenges of collaborative design. We emphasize the application of creative thinking and problem solving to design projects ranging from single to mass-produced artifacts. The areas of application span the range from traditional fine art to interactive media. Examples of current areas of study include interactive computer graphics, animation, illustration, sculpture, painting, drawing, fibers, exhibition design, textile design, and emerging areas in the media arts.

The Art and Design Program firmly believes there is an essential need for students in a technically-based research university to engage in course work that fosters creative thinking. To meet this need, the department offers courses to non-majors as well as a minor in Art and Design, available to majors in any field in the university. Four specific options are currently available: fibers and surface design, painting, drawing, and sculpture.

OPPORTUNITIES

Career opportunities for graduates of the Department of Art and Design span the range from traditional fine art to new media systems. Graduates of this department are currently working in fields such as advertising, multimedia, illustration, exhibition design, textile design, fashion design, art and design education, photography, film making, special effects, set design, and in all areas of fine arts.

CURRICULUM AND DEGREES

The Art and Design Program awards the Bachelor of Art and Design degree. The Bachelor of Art and Design degree is a broadly based, multidisciplinary undergraduate experience that fully utilizes a diverse faculty and bridges the fine arts and design. Through a well-planned sequence of increasingly complex and in-depth studios and close work with faculty, students are able to construct optimal learning paths that meet their individual needs. This degree program provides a sound, well-rounded visual arts education and focuses on providing students with skills that allow them to perform and succeed in a wide variety of art and design positions after graduation.

While the degree is professionally non-specific, students selecting the Bachelor of Art and Design degree may wish to use it as a foundation for later graduate study in a specific art or design discipline. The goal of the Art and Design curriculum is to provide the structure for the creation of a new model of

art and design professional. These individuals' artistic and practical talents are developed as different expressions of one potentiality. We emphasize proficiency of skills in advanced visualization and interactive media in combination with a strong focus on traditional fine arts and design.

CURRICULUM IN ART AND DESIGN
Degree earned: Bachelor of Art and Design

FRESHMAN YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
DF 101 Design Fundamentals Studio	6	DF 102 Design Fundamentals Studio	6
ENG 111 Composition & Rhetoric	3	ENG 112 Composition & Reading	3
History/Literature Elective	3	History/Literature Elective	3
Mathematical Sciences Elective	3	Mathematical Sciences Elective	3
Fitness & Wellness Elective	1	Physical Education Elective	1
	16		16

SOPHOMORE YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
Studio[2]	6	Studio[2]	6
ADN 281 Basic Drawing	3	Design Elective[3]	3
Natural Science Elective with Lab	4	History of Art/Design History[1]	3
History of Art/Design History[1]	3	Writing and Speaking Elective	3
	16		15

JUNIOR YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
Studio[2]	6	Studio[2]	6
Design Elective[3]	3	ADN 418 Contemporary Issues in Art & Design	3
Natural Science Elective with Lab	4	Design Elective[3]	3
Humanities/Social Sciences Elective	3	Humanities/Social Sciences Elective	3
	16	Natural Science Elective	3
			18

SENIOR YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
Studio[2]	6	Studio[2]	6
ADN Art and Design: Theory and Practice[4]	3	Design Elective[3]	3
Humanities/Social Sciences Elective	3	Design Elective[3]	3
Science/Technology/Society Elective	3	Free Elective	3
	15		15

Minimum Hours Required for Graduation: 127

[1]A two-semester survey course in Art History or Design History is required by Art and Design majors. Each course will satisfy three (3) credit hours of the six-hour Humanities/Social Science requirement.
[2]A 400-level, six-credit-hour studio is required each semester. Three of these studios must be in the Art and Design Program. The other three may be from other disciplines within the School of Design. No more than one studio may be taken in any semester.
[3]Any three-credit-hour course in the School of Design. A list of classes/studios that students may choose from to satisfy these requirements is available from your advisor. Art and Design majors must distribute 18 hours of their design electives in the following way:

- Six credit hours Multimedia
- Six credit hours Drawing
- Six credit hours Art/Design History

[4]ADN 418 (Contemporary Issues in Art and Design) and ADN 428 (Art and Design: Theory and Practice) are required classes for all Art and Design Majors. ADN 418 and ADN 428 satisfy the University requirement of major papers during the junior and senior years.

*Art and Design majors are required to take 15 credit hours of classes concentrated in any one (1) of the other four (4) departments in the School of Design (ARC, GD, ID, LAR). In consultation with their advisors, students also have the option of taking a 15-credit hour distribution of classes of selected courses form the University at large.
*The sequence of elective courses is illustrated only and not mandatory. Students may schedule elective courses in any order which supports their educational objectives.
*One (1) course in the above curriculum must focus on a non-English speaking culture. (See courses marked with asterisks under List B in the "General Education Requirements" list).
*Foreign Language proficiency at the 102 level is required for graduation but does not count toward the minimum credit hours.
*Students who change majors within the School of Design are advised to check regarding the application of their general education requirements toward a degree in the new major. Requirements vary among departments.

MINOR IN ART AND DESIGN (Non-Design Majors)
The Minor in Art and Design's objectives are to discover basic design principles through hands-on activities, to apply design process and theory to solve problems creatively and efficiently, to increase awareness of one's self and environment, and to foster an appreciation and understanding of the disciplines of Art and Design. Any curious undergraduate student in the university who is not majoring in design and who seeks alternative methods of experiencing the environment in which we live will benefit from this minor.

The Minor in Art and Design consist of 15 credit hours of study. A student must successfully complete two prerequisite courses (ADN 111 and ADN 112) before applying for entrance into the Minor in Art and Design. These two courses provide and essential foundation in design. A Grade Point Average of 2.75 or above and a faculty review are also required.

After completion of ADN 111 and ADN 112 (6 credit hours), the student must then complete 9 hours of recommended courses selected from the courses listed in the information provided by the Art and Design Program Director. Six (6) hours must be above the 100 level and another three (3) hours at or above the 300 level. A grade of C or better will be required for credit in all courses in the Minor in Art and Design program. The course selection will be determined with the guidance of the student's minor advisor and tailored to the needs, interests and goals of the student.

DEPARTMENT OF GRAPHIC DESIGN

http://www.design.ncsu.edu

Brooks Hall
Phone: (919) 515-8326

J. Spadaro, Head
M. Davis, Director of Graduate Programs

Professors: M. Davis, A. Lowrey, M. Scotford; *Associate Professor:* K. Bailey, A. Blauvelt, J. Spadaro, S. Townsend

Graphic design is the process of bringing meaningful visual form to communication. Graphic designers translate communication goals through printed, environmental, and electronic presentations of information. Graphic designers use words and images to express messages that inform, persuade, and incite to action individuals and audiences. Graphic designers are active in all aspects of communication design. For example, they design books, magazines, newspapers, and CD-ROMS for the publishing industry. They also create printed materials such as logotypes, symbol, annual reports, newsletters, business forms, stationery systems, and other related literature for corporations, institutions, businesses, and governmental agencies. Graphic designers create multimedia presentations, web sites, graphical computer interfaces, and motion graphics such as film titling and typographic treatments for video, as well as on-air graphics for television. Graphic designers are employed in a variety of settings, including graphic design offices, advertising agencies, communication businesses, as well as corporations, institutions, or governmental agencies as part of internal communications departments.

The Bachelor of Graphic Design program includes the study of visual, theoretical, historical, and technical aspects of the discipline. The curriculum provides comprehensive experiences in the analysis of communication problems, the development of creative solutions to those problems, and the implementation and evaluation of those solutions. Required support courses in typography explore the role of words and language in graphic communication, while courses in imaging provide students with experiences in a range of photographic, videographic, and motion graphic media. Instruction in computer software programs is fully integrated in design studios and support courses and is not taught as a separate activity. In their studios, graphic design majors prepare for careers in the field through the execution of demonstration projects of varying complexity and scale. In the last studio, graduating students prepare their portfolios for job searches and demonstrate their expertise in a particular area of practice.

CURRICULUM IN GRAPHIC DESIGN
Degree earned: Bachelor of Graphic Design

FRESHMAN YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
DF 101 Design Fundamentals Studio	6	DF 102 Design Fundamentals Studio	6
ENG 111 Composition & Rhetoric	3	ENG 112 Composition & Reading	3
Mathematical Sciences Elective	3	Mathematical Sciences Elective	3
Humanities Elective	3	Humanities Elective	3
Fitness & Wellness Elective	1	Physical Education Elective	1
	16		**16**

SOPHOMORE YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
GD 201 Graphic Design Studio I	6	GD 202 Graphic Design Studio II	6
GD 210 Imaging for Graphic Design I	3	GD 310 Imaging for Graphic Design II	3
GD 210L Imaging I Lab	0	GD 310L Imaging II Lab	0
GD 217 Type I	3	GD 317 Type II	3
Natural Science Elective with lab	4	GD 317L Type II Lab	0
	16	Natural Science Elective with lab	4
			16

JUNIOR YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
GD 301 Graphic Design Studio III	6	GD 400 Advanced Graphic Design Studio[1]	6
GD 410 Imaging for Graphic Design III	3	GD 342 History of Graphic Design	3
GD 410L Imaging III Lab	0	GD 355 Graphic Design Production	3
GD 417 Type III	3	GD 355L Graphic Design Production Lab	0
GD 417 Type III Lab	0	Design Elective[2]	3
Social Sciences Elective	3	Social Sciences Elective	3
	15		**18**

SENIOR YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
GD 400 Advanced Graphic Design Studio[1]	6	GD 400**Advanced Graphic Design Studio	6
Natural Science Elective	3	Science/Technology/Society Elective	3
Writing and Speaking Elective	3	Adv. Humanities/Social Science Elective	3
Design Elective[2]	3	Adv. Humanities/Social Science Elective	3
	15		15

Minimum Hours Required for Graduation: 127

[1]Students who major Industrial Design may elect as many as (2) six credit hour studios in another department. Declaration of intent to enroll in studios other than Industrial Design during any semester must be made during the pre-registration period prior to enrollment. **No more thao one studio may be taken in any given semester.**

[2]Any course within the Department of Graphic Design or in the School of Design meets this requirement.

*The sequence of elective courses is illustrative only and not mandatory. Students may schedule elective courses in any order which support their educational objectives.

*One course in above the curriculum must focus on a non-English speaking culture. (See courses marked with asterisks under List B in the "General Education Requirements" list).

*Foreign language proficiency at the 102 level is required for graduation but does not count toward the minimum credit hours.

*Students who change majors within the School of Design are advised to check regarding the application of their general education requirements toward a degree in the new major. Requirements vary among departments.

DEPARTMENT OF INDUSTRIAL DESIGN

http://www.design.ncsu.edu

Brooks Hall
Phone: (919) 515-8322

H. Khachatoorian, Head
B. Laffitte, Director of Graduate Programs

Professors: V. M. Foote, H. Khachatoorian, G. Lewis; *Professors Emeritus :* A. Cooke, D.R. Stuart, W. Taylor; *Associate Professor:* B. Laffitte; *Assistant Professor:* P. Hooper.

The Department of Industrial Design awards bachelor degrees in Industrial Design. The pedagogical core of the department aims to reinforce the foundation principles of design theory as applied to traditional and advanced technologies, i.e. new media, materials, and production techniques. Our curriculum addresses broad cultural, ecological, and societal considerations and promotes in our graduates the ability to meet the challenges of technological complexity through collaborative design. We emphasize the application of creative thinking and problem solving to design projects ranging from single to mass-produced artifacts. The areas of application span the range from traditional fine art and industrial design to interactive multimedia. Examples of current areas of study include digital imaging, interactive computer graphics, animation, illustration, fibers, product design, furniture design, ergonomics, and textile design.

OPPORTUNITIES

Career opportunities for graduates of the Department of Industrial Design span the range from industrial design to new media systems. Graduates of this department are currently working in fields such as furniture design, illustration, recreational product design, toy design, exhibition design, textile design, fashion design, photography, film making, special effects, set design, and other areas of industrial design.

CURRICULUM AND DEGREES

The Department of Industrial Design awards four-year bachelor degrees in Industrial Design. Industrial design is concerned with all human aspects of machine-made products and their relationship to the environment. The industrial designer is responsible for human factors engineering, safety, shape, color, texture, maintenance, and cost. Industrial designers deal with consumer, as well as industrial, products. In order to achieve these ends, designers must be involved in four major design and research areas: human behavior, human-machine relationships, the environment, and the product itself.

Furniture Manufacturing, Apparel Technology, and Textile Technology are concentrations offered through collaborations with the Industrial Engineering Furniture Manufacturing and Management Center and the College of Textiles, respectively. Areas of design investigation in the Bachelor of Industrial Design include furniture, textiles, housewares, appliances, transportation, tools, farm equipment, medical instruments, electronics, human-computer interfaces, and recreational support equipment. The goal of the Industrial Design curriculum is to teach the design and development of products or systems and their relationship to human beings and the environment.

The industrial design curriculum is centered around four major design and research activities: product development and design, product safety, the human/machine relationship, and the ecological impact of a product's life cycle. Graduates of the Bachelor of Industrial Design program have career opportunities in three general types of practice: corporate design offices in manufacturing companies, independent consulting offices, and governmental agencies.

CURRICULUM IN INDUSTRIAL DESIGN

Degree earned: Bachelor of Industrial Design

FRESHMAN YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
DF 101 Design Fundamentals Studio	6	DF 102 Design Fundamentals Studio	6
ENG 111 Composition & Rhetoric	3	ENG 112 Composition & Reading	3
Humanities/Social Sciences Elective	3	Social Science Elective	3
Mathematical Sciences Elective	3	Mathematical Sciences Elective	3
Fitness & Wellness Elective	1	Physical Education Elective	1
	16		16

SOPHOMORE YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
ID 400 Industrial Design Studio[1]	6	ID 400 Industrial Design Studio[1]	6
ID 255 Contemporary Manufacturing Processes I	3	ID 256 Contemporary Manufacturing Processes II	3
ID 318 Ideation I	3	ID 418 Ideation II	3
GC 120 Foundation of Graphics	3	Natural Science Elective with lab	4
	15		**16**

JUNIOR YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
ID 400 Industrial Design Studio[1]	6	ID 400 Industrial Design Studio[1]	6
ID 415 Microcomputer Imaging	3	ID 492 Special Topics: Human Factors	3
Natural Science Elective with lab	4	Writing and Speaking Elective[2]	3
Social Science Elective	3	History/Literature Elective	3
	16	Social Sciences Elective	3
			18

SENIOR YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
ID 400 Industrial Design Studio[1]	6	ID 400 Industrial Design Studio[1]	6
Natural Science Elective	3	Adv. Humanities/Social Science Elective	3
Philosophy/Religion/Visual or		Humanities Elective	3
Performing Arts Elective	3	Science/Technology/Society Elective	3
Adv. Humanities/Social Science Elective	3		**15**
	15		

Minimum Hours Required for Graduation: 127

[1]Students who major Industrial Design may elect as many as (2) six credit hour studios in another department. Declaration of intent to enroll in studios other than Industrial Design during any semester must be made during the pre-registration period prior to enrollment. No **more than one studio may be taken in any given semester.**

[2]Any course within the Department of Graphic Design or in the School of Design meets this requirement.

*The sequence of elective courses is illustrative only and not mandatory. Students may schedule elective courses in any order which support their educational objectives.

*One course in above the curriculum must focus on a non-English speaking culture. (See courses marked with asterisks under List B in the "General Education Requirements" list).

*Foreign language proficiency at the 102 level is required for graduation but does not count toward the minimum credit hours.

*Students who change majors within the School of Design are advised to check regarding the application of their general education requirements toward a degree in the new major. Requirements vary among departments.

CURRICULUM IN INDUSTRIAL DESIGN - Apparel Technology Concentration
Degree earned: Bachelor of Industrial Design

FRESHMAN YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
DF 101 Design Fundamentals Studio	6	DF 102 Design Fundamentals Studio	6
ENG 111 Composition & Rhetoric	3	ENG 112 Composition & Reading	3
Humanities/Social Sciences Elective	3	Social Science Elective	3
Mathematical Sciences Elective	3	Mathematical Sciences Elective	3
Fitness & Wellness Elective	1	Physical Education Elective[2]	1
	16		**16**

SOPHOMORE YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
ID 400 Industrial Design Studio I	6	ID 400 Industrial Design Studio	6
ID 318 Ideation I	3	ID 256 Contemporary Manufacturing Processes II	3
Natural Science Elective with lab	4	TT 221 Yarn I	3
TMS 211 Introduction to Fiber Science	3	History/Literature Elective	3
	15	Science/Technology/Society Elective	3
			18

JUNIOR YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
ID 400 Industrial Design Studio	6	ID 400 Industrial Design Studio[1]	6
ID 415 Microcomputer Imaging	3	Writing and Speaking Elective[2]	3
TT 251 Weaving I	3	Natural Science Elective with lab	4
Social Science Elective	3	Textile Elective[4]	3
	16		**16**

SENIOR YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
ADN 470 Fiber and Surface Design Studio	6	ID 400 Industrial Design Studio[1]	6
Philosophy/Religion/Visual or		Design Elective[3]	3
Performing Arts Elective	3	Design[3] or Textile Elective[4]	3
Textile Elective[4]	3	Adv. Humanities/Social Science Elective	3
Adv. Humanities/Social Science Elective	3		15
	15		

Minimum Hours Required for Graduation: 127

[1]Students who major Industrial Design may elect as many as (2) six credit hour studios in another department. Declaration of intent to enroll in studios other than Industrial Design during any semester must be made during the pre-registration period prior to enrollment. **No more than one studio may be taken in any given semester.**

[2]A course from List B is recommended to fulfill the requirement for a major paper. If a course other than from List B fulfills this requirement, that course may be used, pending advisor approval.

[3]Any course within the School of Design meets this requirement.

[4]Apparel Technology minors may choose from the following courses to fulfill this requirement: TAM 218 (Intro. to Apparel Technology Management), TAM 315 (Apparel Production I), TAM 415 (Apparel Product Development), TAM 316 (Apparel Production II)

*The sequence of elective courses is illustrative only and not mandatory. Students may schedule elective courses in any order which support their educational objectives.

*One course in above the curriculum must focus on a non-English speaking culture. (See courses marked with asterisks under List B in the "General Education Requirements" list).

*Foreign language proficiency at the 102 level is required for graduation but does not count toward the minimum credit hours.

*Students who change majors within the School of Design are advised to check regarding the application of their general education requirements toward a degree in the new major. Requirements vary among departments.

CURRICULUM IN INDUSTRIAL DESIGN - Furniture Manufacturing Concentration
Degree earned: Bachelor of Industrial Design

FRESHMAN YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
DF 101 Design Fundamentals Studio	6	DF 102 Design Fundamentals Studio	6
ENG 111 Composition & Rhetoric	3	ENG 112 Composition & Reading	3
Humanities/Social Sciences Elective	3	Social Science Elective	3
Mathematical Sciences Elective	3	Mathematical Sciences Elective	3
Fitness & Wellness Elective	1	Physical Education Elective[2]	1
	16		16

SOPHOMORE YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
ID 400 Industrial Design Studio I	6	ID 400 Industrial Design Studio	6
ID 255 Contemporary Manufacturing Processes I	3	ID 418 Ideation II	3
ID 318 Ideation I	3	Natural Science Elective	4
GC 120 Foundation of Graphics	3	Science/Technology/Society Elective	3
	15		16

JUNIOR YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
ID 400 Industrial Design Studio	6	ID 400 Industrial Design Studio[1]	6
IE 240 Furniture Product Engineering	3	IE 241 Furniture Manufacturing Processes I	3
IE 352 Work Analysis and Design	3	IE 452 Ergonomics	3
History/Literature Elective	3	Writing and Speaking Elective[2]	3
Social Science Elective	3		15
	18		

SENIOR YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
ID 400 Industrial Design Studio	6	ID 400 Industrial Design Studio[1]	6
IE 311 Engineering Economic Analysis	3	History/Literature Elective	3
Natural Science Elective	3	Natural Science Elective	4
Philosophy/Religion/Visual or		Science/Technology/Society Elective	3
Performing Arts Elective	3		16
Adv. Humanities/Social Science Elective	3		
	15		

Minimum Hours Required for Graduation: 127

[1]Students who major Industrial Design may elect as many as (1) six credit hour studio in another department. Declaration of intent to enroll in studios other than Industrial Design during any semester must be made during the pre-registration period prior to enrollment. **No more than one studio may be taken in any given semester.**

[2]A course from List B is recommended to fulfill the requirement for a major paper. If a course other than from List B fulfills this requirement, that course may be used, pending advisor approval.
*The sequence of elective courses is illustrative only and not mandatory. Students may schedule elective courses in any order which support their educational objectives.
*One course in above the curriculum must focus on a non-English speaking culture. (See courses marked with asterisks under List B in the "General Education Requirements" list).
*Foreign language proficiency at the 102 level is required for graduation but does not count toward the minimum credit hours.
*Students who change majors within the School of Design are advised to check regarding the application of their general education requirements toward a degree in the new major. Requirements vary among departments.

CURRICULUM IN INDUSTRIAL DESIGN - Textile Technology Concentration
Degree earned: Bachelor of Industrial Design

FRESHMAN YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
DF 101 Design Fundamentals Studio	6	DF 102 Design Fundamentals Studio	6
ENG 111 Composition & Rhetoric	3	ENG 112 Composition & Reading	3
Humanities/Social Sciences Elective	3	Social Science Elective	3
Mathematical Sciences Elective	3	Mathematical Sciences Elective	3
Fitness & Wellness Elective	1	Physical Education Elective[2]	1
	16		**16**

SOPHOMORE YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
ID 400 Industrial Design Studio I	6	ID 400 Industrial Design Studio	6
ID 318 Ideation I	3	ID 256 Cont. Manufacturing Processes II	3
Natural Science Elective with Lab	4	TT 221 Yarn I	3
TMS 211 Introduction to Fiber Science	3	History/Literature Elective	3
	16	Science/Technology/Society Elective	3
			18

JUNIOR YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
ID 400 Industrial Design Studio	6	ID 400 Industrial Design Studio[1]	6
ID 415 Microcomputer Imaging	3	Writing and Speaking Elective[2]	3
TT 251 Weaving I	3	Natural Science Elective with Lab	4
Social Science Elective	3	Textile Elective[4]	3
	15		**16**

SENIOR YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
ADN 470 Fiber and Surface Design Studio	6	ID 400 Industrial Design Studio[1]	6
Philosophy/Religion/Visual or		Design Elective[3]	3
Performing Arts Elective	3	Design[3] or Textile Elective[4]	3
Textile Elective[4]	3	Adv. Humanities/Social Science Elective	3
Adv. Humanities/Social Science Elective	3		**15**
	15		

Minimum Hours Required for Graduation: 127

[1]Students who major Industrial Design may elect as many as (1) six credit hour studio in another department. Declaration of intent to enroll in studios other than Industrial Design during any semester must be made during the pre-registration period prior to enrollment. No more than one studio may be taken in any given semester.
[2]A course from List B is recommended to fulfill the requirement for a major paper. If a course other than from List B fulfills this requirement, that course may be used, pending advisor approval.
[3]Any course within the School of Design meets this requirement.
[4]Apparel Technology minors may choose from the following courses to fulfill this requirement: TT 241 (Knitting I), TT 305 (Fiberweb and Nonwoven Production), TT 351 (Weaving Systems), TT 451 (Advanced Woven Fabric Design).
*The sequence of elective courses is illustrative only and not mandatory. Students may schedule elective courses in any order which support their educational objectives.
*One course in above the curriculum must focus on a non-English speaking culture. (See courses marked with asterisks under List B in the "General Education Requirements" list).
*Foreign language proficiency at the 102 level is required for graduation but does not count toward the minimum credit hours.
*Students who change majors within the School of Design are advised to check regarding the application of their general education requirements toward a degree in the new major. Requirements vary among departments.

DEPARTMENT OF LANDSCAPE ARCHITECTURE

http://www.design.ncsu.edu
Brooks Hall
Phone: (919) 515-8340

A. R. Rice, Head
A. R. Rice, Director of Graduate Programs

Professors: A. R. Abbate, R. Moore, A. R. Rice; *Professors Emeriti:* R. E. Stipe, R. R. Wilkinson; *Research Associate Professors:* J. E. Fels, J. Tomlinson; *Associate Professors:* F. Magallanes, S. Raval; *Assistant Professor :* M. Myers, *Associate Members of the Faculty:* W. E. Hooker, A. R. Okigbo, M. E. Traer (Horticultural Science), H. Devine (Parks Recreation and Tourism Management); *Adjunct Associate Professors:* C. Flink, Y. Fozard, C. Roe, W. Swink, J. Wick, L. Zucchino

Landscape Architecture is a multi-faceted profession dedicated to the welfare of the environment and living communities of the earth. It is a diverse and growing design profession that combines art, science, engineering, and technology. Landscape Architecture at the School of Design is especially concerned with the stewardship, restoration, and regeneration of the natural and cultural environments in urban, rural and wilderness settings. The five-year Bachelor of Landscape Architecture degree program provides an educational experience that develops in students the skills necessary to deal creatively and responsibly with the forces-human and natural-that inevitably shape the land.

The Bachelor of Landscape Architecture program stresses the development of the student's intellectual capacity through the medium of a comprehensive design education. The program offers an integrated, broad-based education in the discipline of Landscape Architecture program and stresses the development of the student's intellectual capacity through the medium of a comprehensive design education. The program offers an integrated, broad-based education in the discipline of Landscape Architecture and emphasizes interdisciplinary design work, national and international experience, and ecologically sound community-based design and planning. Students develop the ability to think, visualize, analyze, and synthesize ideas using information and skills from diverse fields of study.

This professional degree program serves individuals who are interested in affecting the environment directly through the profession of landscape architecture or going on to earn a graduate degree in Landscape Architecture or related disciplines. In addition, the department is concerned with fostering an individual's sense of responsibility to society as a steward of the cultural and natural environments. Graduates of the Bachelor of Landscape Architecture program have an understanding of the profession, its role in society, and their own potential role. Graduates offer employers and clients strong intellectual problem-solving abilities and the professional skills necessary to evaluate, develop, and communicate solutions to a variety of design and planning problems, including-but not limited to-the design of parks, trail systems, recreational environments, resorts, urban plazas, communities, and conservation plans.

CURRICULUM IN LANDSCAPE ARCHITECTURE

Degree earned: Bachelor of Landscape Architecture

FRESHMAN YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
DF 101 Design Fundamentals Studio	6	DF 102 Design Fundamentals Studio	6
ENG 111 Composition & Rhetoric	3	ENG 112 Composition & Reading	3
Mathematical Sciences Elective	3	Mathematical Sciences Elective	3
Humanities Elective	3	Humanities Elective	3
Fitness & Wellness Elective	1	Physical Education Elective	1
	16		16

SOPHOMORE YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
LAR 400 Landscape Architecture Studio	6	LAR 400 Landscape Architecture Studio	6
Advised LAR Elective[1]	3	MEA 101 Geology I: Physical	3
LAR 430 Site Planning	3	MEA 110 Geology I Lab	1
LAR 430L Site Planning Lab	0	ARC 232 Structures & Materials	3
BO 200 Plant Life	3	Advised LAR Elective[1]	3
	15		16

JUNIOR YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
Required Swing Studio[2]	6	LAR 400 Landscape Architecture Studio	6
HS 211 Ornamental Plants I	3	HS 212 Ornamental Plants II	3
BO 360 Intro. to Ecology	3	Design Elective[3]	3
BO 365 Intro. to Ecology Lab	1	LAR 457 Construction Materials & Methods	3
LAR 221 Intro. to Env. Behavior	3	LAR 457L Construction Materials & Methods Lab	0
	16		15

SENIOR YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
LAR 400 Landscape Architecture Studio	6	Advanced Foreign Language[4]	3
LAR 433 Native Plants & Environ. Design	3	Science/Technology/Society Elective	3
LAR 444 History of Landscape Arch	3	Humanities/Social Sciences Elective	3
Social Sciences Elective	3	Social Sciences Elective	3
	15	Adv. Humanities/Social Sciences Elective	3
			15

SUMMER SEMESTER
LAR XXX[6] Landscape Architecture Studio[5] 6

FIFTH YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
Humanities/Social Sciences Elective	3	LAR XXX[6] BLA Final Project	6
Design Elective[3]	3	Free Elective	3
Adv. Humanities/Social Sciences Elective	3	Free Elective	3
Writing and Speaking Elective	3		**12**
Mathematics/Technology Elective	3		
	15		

Minimum Hours Required for Graduation: 157

[1] LAR Advised electives may be filled by any LAR-prefix courses.
[2] Design (DN), Graphic Design (GD), Industrial Design (ID), Architecture (ARC), or Horticulture (HS) studios. **No more than one studio may be taken in any given semester.**
[3] Any course open to School of Design majors and offered by the School of Design fulfills this requirements.
[4] Foreign language proficiency at the FL 102 level and one semester at the FL 201 level (or in a second foreign language at the FL 102 level) are required for graduation.
[5] International, off-campus studio recommended to fulfill this required studio.
[6] LAR XXX are proposed courses. Numbers will be assigned pending approval by the School of Design and University Curriculum Committees.
*The sequence of elective courses is illustrative only and not mandatory. Students may schedule elective courses in any order which support their educational objectives.
*One course in above the curriculum must focus on a non-English speaking culture. (See courses marked with asterisks under List B in the "General Education Requirements" list).
*Foreign language proficiency at the 102 level is required for graduation but does not count toward the minimum credit hours.
*Students who change majors within the School of Design are advised to check regarding the application of their general education requirements toward a degree in the new major. Requirements vary among departments.

COLLEGE OF EDUCATION AND PSYCHOLOGY

208 Poe Hall
NCSU Box 7801
Raleigh, NC 27695-7801

Phone: (919)515-2231
Fax: (919)515-5836
E-Mail: edu_psy@ncsu.edu _

J.J. Michael, *Dean*
J.R. Kolb, *Associate Dean for Academic Affairs*
E.R. Gerler, *Associate Dean for Research and External Affairs*
C.H. Maidon, *Director of Teacher Education*
T.C. Wall, *Director of Teaching Fellows Program*
A.P. Smith, *Assistant Dean for Student Services*

The College of Education and Psychology focuses on issues of human development from both psychological and educational perspectives. With emphasis upon the preparation of middle grades, high school, and post-secondary teachers, counselors, supervisors, administrators, and psychologists, the college seeks students who are dedicated to the improvement of human beings through education, research and service and who are sensitive to the complexity of the teaching/learning processes. The college is composed of the Department of Adult and Community College Education, Counselor Education, Curriculum and Instruction, Mathematics, Science and Technology Education, and Psychology.

Undergraduate degree programs are offered in education general studies, health occupations education, business and marketing education, mathematics education, middle grades education, science education, technology education and psychology. In addition to being admitted to a curriculum, all teacher education candidates must meet program requirements for admission to candidacy in teacher education (including a 2.500 or higher overall grade point average after the sophomore year) and for admission to student teaching (including a 2.500 or higher GPA overall, in one's teaching field, and in professional studies).

Five degree programs (health occupations education, technology education, business and marketing education, mathematics education, and science education) lead to a license to teach in grades 9-12. A program of professional preparation is provided for those students enrolled in the College of Humanities and Social Sciences who wish to become teachers of secondary English, Social Studies, and teachers of French and Spanish, Grades K-12. The College of Agriculture and Life Sciences and the College of Education and Psychology jointly provide a program to prepare students to become secondary agriculture teachers.

The College of Education and Psychology offers an undergraduate degree in middle grades teaching with concentrations either in language arts/social studies or mathematics/science.

Students enrolled in a natural sciences or a mathematical sciences curriculum may double-major in the Department of Mathematics, Science, and Technology Education and earn a license to teach in grades 6-9 or 9-12.

Most of the college's teacher education programs are in fields of teacher shortage. Graduates have little difficulty finding teaching positions. Because of limited faculty resources, space in some programs is limited.

Most of the education and psychology programs listed in the following pages also offer graduate-level degree programs. In addition, the College of Education and Psychology has graduate programs in:

Adult Education
Counselor Education
Curriculum and Instruction
Educational Administration
Educational Research and Policy Analysis
Elementary Education
Health Professions Occupations
Higher Education Administration
Middle Grades Education
Occupational Education
Reading Education
Special Education
Training and Development

See Graduate Catalog or contact faculty members for information on graduate programs.

Public schools post-master's licensure programs are available in some curricular areas. All of the bachelor's level and graduate level licensure programs are approved by the North Carolina Board of Education. The college is accredited by the American Psychological Association (APA), the Council for the Accreditation of Counseling and Related Programs (ACREP), and the National Council for the Accreditation of Teacher Education (NCATE).

The College of Education and Psychology is located in Poe Hall. It includes a Learning Resources Library, a Center for Learning Technologies, and an Instructional Computing Facility. The building houses laboratories for technology education, reading, science, psychology, counseling and testing activities.

SCHOLARSHIPS

The College of Education and Psychology has a scholarship program distinct from the campus Merits Awards Program. Over 20 scholarships are awarded to undergraduates each year.

North Carolina State University is one of 14 institutions participating in the NC Teaching Fellows Program and has over 120 teaching fellows enrolled. Each fellow receives $5,000 per year for four years in exchange for a commitment to teach for four years in-state.

Other students receive awards through the North Carolina Board of Education's Scholarship Loan Fund for Prospective Teachers and through other sources. High school counselors receive information about, and applications for, all of these scholarships and awards.

SCHOLARS AND HONORS PROGRAMS

The College of Education and Psychology participates in the University Scholars Program, in which selected students each year participate in weekly

activities that broaden and deepen their university experiences. The Psychology Department offers an optional curriculum for honors students. There is an honors society in psychology, one in education and one in technology education.

INTERNATIONAL ACTIVITIES Several faculty members have been involved in overseas projects in China, Ghana, Japan, Peru, Puerto Rico, and Russia, and South Africa. Some of the foreign language teacher education students spend a year in France or Spain in an exchange program. The enrollment of international students in the several education and psychology programs and elsewhere at NC State also offers on-campus multi-cultural opportunities.

DEPARTMENT OF ADULT AND COMMUNITY COLLEGE EDUCATION

(See Graduate Catalog)

DEPARTMENT OF AGRICULTURAL AND EXTENSION EDUCATION

Ricks Hall, Room 13A *(See College of Agriculture and Life Sciences)*
Phone: (919) 515-9060

J. L. Flowers, *Coordinator of Advising*

Students desiring to become secondary Agriculture teachers in grades 9-12 should seek enrollment in the college of Agriculture and Life Sciences. Refer to the catalog section, Department of Agricultural Extension and Education for curriculum requirements.

DEPARTMENT OF CURRICULUM AND INSTRUCTION

Poe Hall, Room 602
Phone: (919) 515-3221

C.L. Crossland, *Head*
B.J. Fox, *Director of Graduate Education*
C.M. Beal, *Director of Undergraduate Education*

Professors: C.L. Crossland, D.A. Cullinan, B.J. Fox, P.H. Martorella, B.R. Poulton; *Associate Professors:* P.L. Marshall, T.P. O'Brien, S.S. Osborne, C.A. Pope, R.J. Pritchard, A.J. Reiman, E.J. Sabornie, H. A. Spires, E.S. Vasu; *Assistant Professors:* M. Alibrandi, C.M. Beal, S.M. Butler, A.V. Wilson; *Visiting Assistant Professor:* M. Terhaar- Yonkers; *Adjunct Professors:* D.D. Copeland, R. A. Edelfelt; *Adjunct Assistant Professors:* S. B. Buckner, C.J. Messina, W.R. Parker; *Professor Emeritus:* B.M. Parramore; *Associate Professor Emeritus:* J.F. Arnold, L. Thies-Sprinthall.

The Department of Curriculum and Instruction prepares undergraduate students to become teachers of middle grades language arts and social studies, secondary marketing education, and to become leaders in health occupations. The Department currently includes a diversity of highly qualified students. All programs emphasize scholarship an individually designed study, and include cross-disciplinary work and field-based experiences.

CURRICULA IN HEALTH OCCUPATIONS TEACHER EDUCATION

Poe Hall, Room 402

The Health Occupations Education program goal is to provide learning experiences that permit students to develop specific competencies associated with effective teaching and leadership roles as they relate to health care. The Bachelor of Science program prepares qualified individuals for various positions in hospitals, secondary schools, community colleges, and other post-secondary institutions. Some graduates seek teaching positions in their own health fields; others choose to teach high school health occupations education. Some work in health care delivery in area hospitals and health agencies, while others work in a variety of capacities in business, industry, and government. Thirty hours of equivalency credit is granted by validation of a current credential in a health occupations specialty recognized by the American Dental Association, American Medical Association-Committee on Allied Health Education and Accreditation, or National League for Nursing.

CURRICULUM IN HEALTH OCCUPATIONS EDUCATION, LICENSURE OPTION

Degree earned: B.S. in Health Occupations Education

FRESHMAN YEAR

All Health occupations students transfer into the curriculum. Generally most have 30 semester hours or more of transfer credit.

SOPHOMORE YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
ENG 111 Comp. & Rhetoric	3	ENG 112 Comp. & Reading	3
Math Elective[1]	3	Science Elective[2]	4
Science Elective[2]	4	History/Literature[4]	3
Writing/Speaking Elective[3]	3	EOE 207 Intro. to Teaching Occ. Education	3
EOE 101 Intro. to Occ. Education	1	Math Elective[1]	3
ECI 451 Improving Reading Sec. Schools	2		**16**
	16		

JUNIOR YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
Science Elective[2]	3	ECI 333 Health Care Delivery	3
Math/Science Elective[5]	3	Humanities/Social Science Elective[6]	3
PSY 304 Educational Psychology	3	ECI 336 Strategies of Teaching Health Occ.	3
History/Literature Elective[4]	3	ELP 334 School and Society	3
ECI 332 Health Promotion & Disease Prev.	3	ECI 335 Planning Classroom & Clinic	3
ED 310 Teaching Adolescents	1		15
Any 100-level PE in Fitness & Wellness	1		
	17		

SENIOR YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
Humanities/Social Science Elective[7]	3	ECI 437 Health Occ. Teach Practicum	8
ECI 438 Medical Law & Ethics	3	Humanities/Social Science Elecitve[8]	3
Free Elective	3	Humanities/Social Science Elective[9]	3
PSY 376 Development Psychology *or*			14
PSY 476 Psychology of Adolescent Dev.	3		
ECI 436 Evaluat. Skills of Tchng a Hlth. Occ.	3		
Physical Education Elective	1		
	16		

Minimum Hours Required for Graduation: 124[10,11]

[1]Two courses (six semester hours) selected from mathematics, statistics, and logic; one course (3 semester hours) must be a mathematics course.
[2]Three courses (11 semester hours) from natural sciences; two selected from biology, chemistry, earth sciences, and physics; one selected from natural sciences other than those previously listed. Two of these courses must have a Lab.
[3]One course (3 semester hours) from advanced writing elective, communication/speech elective, or foreign language elective lists.
[4]Two courses (6 semester hours) from History elective and/or literature elective.
[5]One course (3 semester hours) in mathematical sciences or natural sciences electives.
[6]One course (3 semester hours) from one of the following elective areas: philosophy, religion, visual and performing arts. The course must focus on non-English speaking culture.
[7]One course (3 semester hours) from one of the following elective areas: economics, politics and government, sociology, anthropology, or cultural geography.
[8]One course (3 semester hours) from the science, technology, and society (Humanities and Social Sciences perspectives list).
[9]One course (3 semester hours) from the electives in # seven above or the Humanities and Social Sciences (additional) list.
[10]Must have demonstrated foreign language proficiency at the FL-102 level.

CURRICULUM IN HEALTH OCCUPATIONS EDUCATION, NON-LICENSURE OPTION
Degree earned: B.S. in Health Occupations Education

FRESHMAN YEAR

All Health occupations students transfer into the curriculum. Generally most have 30 semester hours or more of transfer credit.

SOPHOMORE YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
ENG 111 Comp. & Rhetoric	3	ENG 112 Comp. & Reading	3
Math Elective[1]	3	Science Elective[2]	4
Science Elective[2]	4	History/Literature[4]	3
Writing/Speaking Elective[3]	3	Free Elective	3
Free Elective	3	Math Elective[1]	3
	16		16

JUNIOR YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
Science Elective[2]	3	ECI 333 Health Care Delivery	3
Math/Science Elective[5]	3	Humanities/Social Science Elective[6]	3
PSY 304 Educational Psychology	3	Humanities/Social Science Elective[7]	3
History/Literature Elective[4]	3	ECI 336 Strategies of Teaching Health Occ.	3
ECI 332 Health Promotion & Disease Prev.	3	ECI 335 Planning Classroom & Clinic	3
Any 100-level PE in Fitness & Wellness	1		15
	16		

SENIOR YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
ECI 433 Health Occ. Specialty Practicum	3	ECI 437 Health Occ. Teach Practicum	3
ECI 438 Medical Law & Ethics	3	Humanities/Social Science Elecitve[8]	3
Free Elective	6	Humanities/Social Science Elective[9]	3
ECI 436 Eval. Skills of Teaching a Hlth. Occ.	3	ECI 434 Clinical Supervision in HOE	3
Physical Fitness Elective	1	Free Elective	3
	16		15

Minimum Hours Required for Graduation: 124[10,11]

[1]Two courses (six semester hours) selected from mathematics, statistics, and logic; one course (3 semester hours) must be a mathematics course.
[2]Three courses (11 semester hours) from natural sciences; two selected from biology, chemistry, earth sciences, and physics; one selected from natural sciences other than those previously listed. Two of these courses must have a Lab.
[3]One course (3 semester hours) from advanced writing elective, communication/speech elective, or foreign language elective lists.
[4]Two courses (6 semester hours) from History elective and/or literature elective.
[5]One course (3 semester hours) in mathematical sciences or natural sciences electives.
[6]One course (3 semester hours) from one of the following elective areas: philosophy, religion, visual and performing arts. The course must focus on non-English speaking culture.
[7]One course (3 semester hours) from one of the following elective areas: economics, politics and government, sociology, anthropology, or cultural geography.
[8]One course (3 semester hours) from the science, technology, and society (Humanities and Social Sciences perspectives list).
[9]One course (3 semester hours) from the electives in # seven above or the Humanities and Social Sciences (additional) list.
[10]Must have demonstrated foreign language proficiency at the FL-102 level.

CURRICULUM IN BUSINESS AND MARKETING EDUCATION
Poe Hall, Room 402

T. O'Brien, *Coordinator*

The Business and Marketing Education curriculum is specifically designed to prepare teachers for Business and Marketing Education programs in secondary schools. In addition, it provides the necessary pedagogical and technical preparation needed by business and marketing instructors in community and technical colleges, as well as for selected training and development roles in business and industry. The combination of a broad general and professional education, business and marketing courses, and supervised work experience in marketing jobs provides a unique preparation for educators in a rapidly expanding occupational area.

CURRICULUM IN BUSINESS AND MARKETING EDUCATION
Degree earned: B.S. in Business and Marketing Education

FRESHMAN YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
EOE 101 Intro. to Occ. Education	1	CSC 200 Intro. to Computers	3
ENG 111 Comp. and Rhetoric	3	ENG 112 Comp. and Reading	3
Mathematical Sciences Elective[1]	3	History Elective[4]	3
100-level PE in Fitness & Wellness	1	Speech Elective[5]	3
Natural Science Elective[2]	4	Physical Education Elective	1
Sci./Technology/Soc. Elective[3]	3	Natural Science Elective[2]	3
	15		**16**

SOPHOMORE YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
EC 201 Economics I	3	EC 202 Economics II	3
EOE 207 Int. to Teach. Occ. Education**	3	BUS 360 Marketing Methods	3
Literature Elective[4]	3	Natural Science Elective[2]	4
PSY 304 Educational Psychology**	3	SOC Elective[4]	3
Free Elective	3	Political Science Elective[4]	3
	15		**16**

JUNIOR YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
BUS(ST) 350 Economics & Bus. Statistics	3	ACC 280 Managerial Accounting	3
BUS 467 Adv. and Sales Promotion*	3	BUS 307 Business Law I	3
ELP 344 School and Society**	3	BUS 330 Human Res. Mgmt.	3
PSY 376 Human Growth and Dev., or		EOE 307 Field Work in Occ. Education	2
PSY 476 Psy. of Adolescence	3	PHI 314 Issues in Business Ethics	3
BUS 466 Sales Mgmt.*	3	BUS 468 Marketing Mgmt. and Plan.*	3
ED 310 Tutoring Adolescents	1		**17**
	16		

SENIOR YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
BUS 462 Marketing Research	3	ECI 447 Student Teaching in MKE	8
ECI 444 Adm. of Marketing Education	3	ECI 494 Senior Seminar in MKE	3
ECI 446 Curr. and Methods of MKE**	3	Free Elective	3
ECI 451 Reading in the Sec. School	2		**14**
Economics & Bus. Elec. (300 or 400 level)	3		
Free Elective	3		
	17		
		Minimum Hours Required for Graduation:	**126*** **

* Taken at Meredith College through the Cooperating Raleigh Colleges Agreement
** Prerequisites to the Professional Semester

*** Must also have demonstrated foreign language proficiency at the FL_ 102 level

NOTES:

[1] Must be a mathematics course.

[2] Two from natural sciences elective list (biology, chemistry, earth sciences, and physics) and one from natural sciences elective list (other than biology, chemistry, earth sciences, and physics); two of the three courses must have a lab.

[3] Course must be taken from the Sci./technology/and society (science and technology perspective) electives list.

[4] One must focus on a non-English speaking culture.

[5] Select form communications/speech elective.

CURRICULA IN MIDDLE GRADES EDUCATION
Degree earned: B.S. in Middle Grades Education

C. M. Beal, *Coordinator*

LANGUAGE ARTS/SOCIAL STUDIES CONCENTRATION

FRESHMAN YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
ECI 102 Orient to Mid. Grades Education	0	ENG 112 Comp. & Reading	3
ENG 111 Comp. & Rhetoric	3	HI 251 Early American History *or*	
HI 205 Western Civ. Since 1400 *or*		HI 252 Modern American History	3
HI 233 World in 20th Century	3	Math, Logic, or Stat. Elective[2]	3
Mathematics Elective[1]	3	Natural Science Elective[3]	4
Natural Science Elective[3]	4	Political Science Elective[5]	3
Communication Elective[4]	3	Physical Education Elective	1
Any 100-level PE in Fitness & Wellness	1		17
	17		

SOPHOMORE YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
ENG 262 English Literature II	3	SOC 305 Race & Ethnic Relations	3
HI 275 Intro. to History of S & E Africa *or*		ECI 205 Intro. Teach Humanities & Soc.Sci.	3
HI 276 Intro. to History of W. Africa	3	PSY 304 Educational Psychology	3
GEO 200 Prin. of Geography	3	American Literature Elective*	3
American Literature Elective*	3	Anthropology Elective[2]	3
Natural Science Elective[3]	3		15
	15		

JUNIOR YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
ECI 305 Prin. Teach Diverse Pop.	3	ECI 306 Middle Grades Reading	3
ECI 415 Arts & Adolescence	2	ECI 307 Writing Across Curriculum	3
ELP 344 School and Society	3	ECI 309 Teaching in Middle Grades**	3
PSY 476 Psych. of Adolescent Dev.	3	ED 310 Tutoring Adolescents**	1
PEH 280 Emer. Medical Care & First Aid *or*		Sci./Technology/Soc. Elective[2]	3
PEH 285 Personal Health	2	Economics Elective[6]	3
Literature Elective[2]	3		16
	16		

SENIOR YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
ECI(ENG) 405 Lit. for Adolescents	3	ECI 416 Teach Exceptional Child	3
ECI 430 Meth. & Materials in Mid. Gr. LA	4	ECI 454 Student Teach in Language Arts	5
ECI 435 Meth. & Materials in Mid. Gr. SS	4	ECI 464 Student Teach Soc. Stud.	5
ENG 328 Language and Writing *or*			13
ENG 422 Writ. Theory & Writ. Process *or*			
ENG 210, 324, 325, 326, or 328	3		
HI 364 North Carolina History[7]	3		
	17		
		Minimum Hours Required for Graduation:	126[a]

[a]Students must demonstrate foreign language proficiency at the FL _ 102 level.

[1]MA 103, 105, 111, 114, 121, 131, 214. MA 101 is excluded.

[2]Any course from the appropriate university approved list of electives.

[3]BIO 105, BO 200, CH 100, CH 101, MEA 101 or PY 131 and one additional course from the university approved natural science (basic or other) lists.

[4]COM 112, 202, 212, 312, 322

[5]PS 201, 202, 231, 236

[6]EC 201, ARE 201 or ARE 210

[7] For prospective NC certification only; others take HI elective at 300-400 level from the approved Humanities and Social Science list.

*ENG 248, 265, 266, 283, 305, 349, 369, 448, 468.

** Courses are offered both Fall and Spring

MATHEMATICS/SCIENCE CONCENTRATION

K. S. Norwood, *Coordinator*

Curriculum requirements for the mathematics/science concentration can be located in the Department of Mathematics, Science and Technology Education section of this catalog.

CURRICULA IN EDUCATION, GENERAL STUDIES
Poe Hall, Room 608

P. A. Hessling, *Coordinator of Advising*

The Education, General Studies program has two areas of emphasis. Emphasis A serves those students who are interested in those fields of education that do not require formal certification, such as juvenile homes, day care, and other public and private agencies. Emphasis B serves those students previously enrolled in teacher education programs at North Carolina State University, but whose career goals have changed.

EDUCATION: GENERAL STUDIES
Emphasis A: Students Preparing For Non-Certified Postions In Education
Degree earned: B.S. in Education, General Studies

FRESHMAN YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
ENG 111 Comp. & Rhetoric	3	ENG 112 Comp. & Reading	3
Mathematical Sciences	3	Mathematical Sciences	3
PSY 200 Intro. to Psy.	3	SOC 202 Prin. of Sociology	3
Fl 101 Foreign Language	3	Free Elective	3
Any 100-level PE in Fitness and Wellness	1	Humanities/Social Science Elective	3
	13	Physical Education Elective	1
			16

SOPHOMORE YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
Natural Science (Basic)	4	Natural Science (Basic)	4
PHI 205 Problems & Types	3	Comm/Speech Elective	3
Humanities/Social Science Elective	3	Visual & Perf. Arts Elective	3
History or Lit. Elective	3	History or Lit. Elective	3
Free Elective	3	Education: Introductory	3
Physical Education Elective	1	Physical Education Elective	1
	17		**17**

JUNIOR YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
Natural Science (Other)	3	Sci./Technology/Soc. Elective	3
ELP 344 School & Society	3	Education or Psy. Elective	3
PSY 304 Educational Psy.	3	PSY 376 Developmental Psy.	3
Education or Psy. Elective	3	SOC 311 Community Relations	3
SOC 305 Racial & Ethnic Rel.	3	PSY 310 Learning & Motivation *or*	
Advanced Writing Elective	3	PSY 320 Cognitive Processes	3
	18		**15**

SENIOR YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
Free Elective	3	ELP 201 Alt. Educational Agencies	3
ELP 496 Special Topic (EGS)	3	SOC 418 Sociology of Education	3
Education or Psy. Electives	9	Education or Psy. Electives	6
	15	Comm/Speech Elective	3
			15

Minimum Hours Required for Graduation: 124

EDUCATION: GENERAL STUDIES
Emphasis B: Students Formerly In Teacher Education Programs
Degree earned: B.S. in Education, General Studies

FRESHMAN YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
ENG 111 Comp. & Rhetoric	3	ENG 112 Comp. & Reading	3
Mathematical Sciences	3	Mathematical Sciences	3
PSY 200 Intro. to Psy.	3	SOC 202 Prin. of Sociology	3
Fl 101 Foreign Language	3	Free Elective	3
Any 100-level PE in Fitness and Wellness	1	Humanities/Social Science Elective	3
	13	Physical Education Elective	1
			16

SOPHOMORE YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
Natural Science (Basic)	4	Natural Science (Basic)	4
PHI 205 Problems & Types	3	Comm/Speech Elective	3
Humanities/Social Science Elective	3	Visual & Perf. Arts Elective	3
History or Lit. Elective	3	History or Lit. Elective	3
Free Elective	3	Education: Introductory	3
Physical Education Elective	1	Physical Education Elective	1
	17		**17**

JUNIOR YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
Natural Science (Other)	3	Sci./Technology/Soc. Elective	3
ELP 344 School & Society	3	Education or Psy. Elective	3
PSY 304 Educational Psy.	3	PSY 376 Developmental Psy.	3
Advanced Writing Elective	3	Supporting Elective	3
Teaching Field	3	Teaching Field	6
	15		**18**

SENIOR YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
Free Elective	3	ELP 201 Alt. Educational Agencies	3
Supporting Elective	3	Supporting Elective	3
Teaching Field	9	Teaching Field	9
	15		**15**

Minimum Hours Required for Graduation: 124

ENGLISH TEACHER EDUCATION
L. H. MacKethan, *Coordinator of Advising*

Students desiring to become secondary English teachers in grades 9-12 will be enrolled in the College of Humanities and Social Sciences. In that College's section of this Catalog, curriculum requirements for the teacher education option can be found under the Department of English. Students desiring to become language arts teachers in grades 6-9 will be enrolled in the College of Education and Psychology. For details, consult the Middle Grades Education description.

FRENCH TEACHER EDUCATION
Students desiring to become teachers of French will be enrolled in the College of Humanities and Social Sciences. In that College's section of this Catalog, curriculum requirements for the teacher education option in French can be found under Foreign Languages and Literatures.

DEPARTMENT OF MATHEMATICS, SCIENCE AND TECHNOLOGY EDUCATION

www2.ncsu.edu/cep/mathsci/msthomepage

Poe Hall, Room 326
Phone: (919) 515-2238

J.E. Penick, *Head*
J.H. Wheatley, *Associate Head*
W.M. Waters, *Director of Graduate Programs for Mathematics Education*
D.A. Adams, *Director of Graduate Programs for Occupational Education*
S.L. Westbrook, *Director of Graduate Programs for Science Education*
R.E. Wenig, *Director of Graduate Programs for Technology Education*

Alumni Distinguished Undergraduate Professors: J.R. Kolb, J.C. Park, L.W. Watson; *Professors:* L.M. Clark, J.R. Kolb; *Professors Emeriti:* N.D. Anderson, H.E. Speece; *Associate Professors:* V.W. DeLuca, W.J. Haynie III, K.S. Norwood, J.C. Park, R.E. Peterson, L.V. Stiff, W.M. Waters Jr., L.W. Watson, R.E. Wenig, S.L. Westbrook, J.H. Wheatley; *Associate Professor Emeritus:* H.A. Shannon; *Research Associate Professor:* H.S. Stubbs; *Assistant Professors:* T.J. Branoff, G.S. Carter, A. Clark, E.N. Wiebe; *Assistant Professor Emeritus:* J.L. Crow, W.J. Vanderwall; *Visiting Assistant Professor:* K.R. Dawkins; *Instructors:* B. Mattews, A.Y. Scales; *Lecturer:* J.F. Freeman, E.N. Wiebe; *Lecturers Emeriti:* G.K. Hillard, B.D. Webb; *Adjunct Assistant Professors:* R.R. Jones, J.A. Lutz, C.M. Meek, J.J. Mintzes, W.E. Spooner, L.M. Stroud.

The Department of Mathematics, Science and Technology Education prepares undergraduate students to become teachers of mathematics, science and technology. The department traditionally prepares competent professionals who have strong subject-matter backgrounds and pedagogical skills. Departmental majors may seek licensure for teaching high school grades 9-12 or middle school grades 6-9. Students in the high school curriculum in mathematics education or science education take approximately 45 percent of their program in science and mathematics and may complete a double major, receiving a second degree in mathematics or one of the sciences. Students in Technology Education may be licensed as teachers of technology programs in middle grades and high schools. All pre-service teaching programs provide a broad background; an in-depth study in mathematics, technology or an area of science; and the development of professional competencies.

In addition, the technology education curriculum provides a non-teaching option with a general technical background for a variety of employment opportunities in business and industry. A minor in Technology Education is available. The department also offers a minor in Graphic Communications in which the student develops proficiency in applying graphic techniques in both career and leisure activities.

SCHOLARSHIPS AND AWARDS

The Speece Scholarship is awarded annually to as many as three outstanding juniors or seniors in either mathematics education or science education. The department sponsors two undergraduate organizations: the Mathematics and Science Education Club and the Technology Education Collegiate Association. Annual awards are given to the outstanding seniors in Mathematics Education (9-12), Science Education (9-12), Technology Education (6-12), and Middle Grades Education (6-9) in mathematics and in science. Technology education students are eligible for the Epsilon Pi Tau Leadership Award.

CURRICULA IN MATHEMATICS EDUCATION

Degree Earned: B.S. in Mathematics Education
Poe Hall, Room 326
L. V. Stiff, *Coordinator*

CURRICULUM IN MATHEMATICS EDUCATION

Mathematics Education Grades 9-12 Licensure

REQUIREMENTS

General Studies (54-57 semester hours)	**Credits**
English and Communication Courses	
ENG 111 Comp. and Rhetoric	3
ENG 112 Comp. and Reading	3
Communication Elective (COM 110, 112, or 211)	3
	9
Science Courses	
Physical Science[6]	8
Natural Science Elective	3-4
	11-12
Physical Education and Free Electives	
Any 100-level PE in Fitness & Wellness	1
Physical Education Elective	1
Free Electives	6-9
	8-11

	Credits
Humanities and Social Science Courses	
History Elective[1,2]	3
Humanities Electives/Soc.Sci. Elective[1,2]	3
Literature Elective[1,2]	3
Social Electives[1,2,3]	3
Phil., Relig., Vis/Perf. Arts Electives[1,2]	3
Psy 304 Educational Psychology	3
Sci./Technology/Soc. Elective[4]	3
Multicultural Elective[2,5]	3
	24

Teaching Major (43-46 semester hours)	
Core Courses (required of all students)	
E 115 Intro. to Computing Environment	1
CSC 112 or 114 Intro. to Computing	3
MA 141 Analytic Geom. and Calculus I	4
MA 241 Analytic Geom. and Calculus II	4
MA 242 Analytic Geom. and Calculus III	4
MA 403 Intro. to Modern Algebra	3
MA 408 Foundation of Euclidean Geom.	3
LOG 201 Logic	3
ST 101 Statistics by Example	3
	28
Specializations (choose one of these)	
Mathematics	
MA 225 Structure of Real Number System	3
MA 341 Applied Diff. Equations I	3
MA 405 Intro. to Linear Algebra and Matrices	3
MA 433 History of Mathematics	3
Math Elective[7]	3
	15

Statistics	
MA 225 Foundations of Advanced Mathematics	3
MA 305 Elementary Linear Algebra or	
MA 405 Intro. to Linear Algebra and Matrices	3
ST 301 Statistical Methods I	3
ST 302 Statistical Methods II	3
ST 421 Intro. to Mathematical Statistics I	3
ST 422 Intro. to Mathematical Statistics II	3
	18
Computer Science	
MA 225 Structure of Real Number System or	3
CSC 222 Applied Discrete Mathematics	3
CSC 210 Programming Concepts	3
CSC 311 Data Structures	3
MA 305 Elementary Linear Algebra or	
MA 405 Intro. to Linear Algebra and Matrices	3
CSC Elective	3
	18

Professional Studies (required of all students)(30 hours)			
ECI 416 Tchng Excep. Children Mnstrmed Classrms	3	EMS 470 Methods and Materials with Microcomputers[8]	3
ED 310 Tutoring Adolescents	1	EMS 471 Student Teaching in Mathematics[8]	8
ELP 344 School and Society	3	EMS 472 Teaching Mathematics Topics in Senior High[8]	3
EMS 101 Orientation to Mathematics and Sci. Ed.	0	EMS 480 Teaching Mathematics with Microcomputers	3
EMS 203 Intro. to Teaching Mathematics and Science	3	PSY 476 Psychology of Adolescent Dev.	3
			30

Minimum Hours Required for Graduation: 128

[1] Must be chosen from the university's official lists for humanities and social sciences
[2] At least one of the indicated course must be chosen from the university's non-English speaking cultures' list
[3] Social science elective can not be a Psychology course
[4] Must be chosen from the University's Sci./Technology/Soc. Elective list
(humanities and social sciences perspective)
[5] Chosen from ANT 252, COM/ANT/HSS 392, SOC 305, or ECI 305
[6] Must choose one of the following two-course sequences: CH 101/102 CH 201/202, or PY 205-208 or PY 211-212
[7] Must be a course at 200-level or above or MA 105
[8] These courses are taken together as a block in the fall semester. Student teaching is full-time for ten weeks.

CURRICULUM IN MATHEMATICS EDUCATION

Middle School Mathematics (With Science) Grades 6-9 Licensure

K. S. Norwood, *Coordinator*

REQUIREMENTS

General Studies (56-57 semester hours)	**Credits**
English and Communication Courses	
ENG 111 Comp. and Rhetoric	3
ENG 112 Comp. and Reading	3
COM 110 or COM 112 or COM 211	3
	9
Physical Education and Free Electives	
Any 100-level PE in Fitness & Wellness	1
Physical Education Elective	1
PEH 280 Emergency Medical Care and First Aid or	
PEH 285 Personal Health	2
Free Electives	4
	8

	Credits
Humanities and Social Sciences Course	
History Elective[1,2]	3
Humanities/Social Science Electives[1,2]	6
Literature Elective[1,2]	3
Social Science Elective[1,2,3]	3
Phil., Relig., Vis/Perf.Arts Elective[1,2]	3
Psy 304 Educational Psychology	3
Sci./Technology/Soc. Elective[4]	3
Multicultural Elective[2,5]	3
	27
Science Courses	
PY 131 Conceptual Physics	4
BIO 125 General Biology	4
MEA 101/110 Physical Geology and Lab	3-4
	11-12

Teaching Major (36 semester hours)	
CH 100 or CH 101/102 Chemistry/Lab	4
CSC 200 Intro. to Computers and Their Uses	3
MA 105 Mathematics of Finance	3
MA 114 Intro. to Finite Math with Applications	3
MA 141 Analytic Geom. & Calculus I	4
MA 241 Analytic Geom. & Calculus II	4
MA 225 Foundations of Advanced Mathematics	3
MA 308 College Geom.	3
MA 433 History of Mathematics	3
MEA 130 Weather or PY 123 Astronomy	3
Statistics Elective	3
	36

Professional Studies (39 semester hours)	
ECI 306 Middle Years Reading	3
ECI 309 Teaching in the Middle Years	3
ECI 416 Tchng Excep Students in Mainstreamed Classrm	3
ED 310 Tutoring Adolescents	3
ELP 344 School and Society	3
EMS 101 Orientation to Math and Science Education	0
EMS 203 Intro. to Teaching Mathematics and Science	3
EMS 470 Methods & Materials for Tchng Mathematics[8]	3
EMS 471 Student Teaching in Mathematics[8]	8
EMS 474 Teaching Math Topics in the Middle Grades[8]	3
EMS 480 Teaching Mathematics with Microcomputers	3
PSY 476 Psychology of Adolescent Dev.	3
	36

Minimum Hours Required for Graduation[9]: 128

[1] Must be chosen from the university's list of approved humanities and social sciences
[2] At least one of the indicated courses must be chosen from the non-English speaking cultures list
[3] Social science elective may not be a psychology course
[4] Must be chosen from the Sci./Technology/Soc. Elective list (humanities and social sciences perspective)
[5] Chosen from ANT 252, COM/ANT/HSS 392, SOC 305, ECI 305
[6] Chosen from basic natural sciences elective list. At least two of the three science courses must have a lab
[7] Chosen from additional natural sciences elective list
[8] Taken together as a block in the fall only. Student teaching is full-time for ten weeks.
[9] Student must meet University requirements for foreign language

CURRICULA IN SCIENCE EDUCATION

Degree Earned: B.S. in Science Education
Poe Hall, Room 326

G. S. Carter, *Coordinator*

SCIENCE EDUCATION GRADES 9-12 LICENSURE

REQUIREMENTS

General Studies (35-40 semester hours)	**Credits**
English and Communication Courses	
ENG 111 Comp. and Rhetoric	3
ENG 112 Comp. and Reading	3
COM 110 Public Speaking	3
	9
Physical Education and Free Electives	
Any 100-level PE in Fitness & Wellness	1
Physical Education Elective	1
Free Electives	0-5
	2-7

	Credits
Humanities and Social Sciences Courses	
History Elective[1,2]	3
Literature Elective[1,2]	3
Phil., Relig., Vis/Perf. Arts Elective[1,2]	3
Social Science Elective[1,2,3]	3
Humanities/Social Science Elective[1,2]	3
PSY 304 Educational Psychology	3
Sci./Technology/Soc. Elective[4]	3
Multicultural Elective[5]	3
	24

Specialization (52-67 semester hours)

Biology (59-62)

Specialization Courses	
BO 200 Plant Life	4
BO 360 Intro. to Ecology	3
BO 365 Ecology Lab	1
BIO 125 General Biology	4
GN 301 Genetics in Human Affairs or	3-4
GN 411 Prin. of Genetics	
MB 351 General Microbiology or	3-4
BCH 451 Introductory Biochemistry	4
ZO 201 General Zoology	
ZO (BO) 414 Cell Biology or	
BO 421 Plant Physiology	3
	25-27

Supporting Courses	
CH 101 Chemistry - A Molecular Science	3
CH 102 General Chemistry Lab	1
CH 201 Chemistry - A Quantitative Science	3
CH 202 Quantitative Chemistry Lab	1
CH 220 Introductory Organic Chemistry or	4
CH 221 Organic Chemistry I	
MA 131 Calc. for Life & Mgmt. Sciences A or	
MA 121 Elements of Calculus	3
MA 231 Analytic Geom. & Calculus B or	
ST 311 Intro. to Statistics	3
MEA 101 Geology I: Physical	3
MEA 110 Geology I: Lab	1
PY 211 College Physics I	4
PY 212 College Physics II	4
Earth Science Elective	3-4
	33-34

Chemistry (62-64)

Specialization Courses	
CH 101 Chemistry - A Molecular Science	3
CH 102 General Chemistry Lab	1
CH 201 Chemistry - A Quantitative Science	3
CH 202 Quantitative Chemistry Lab	1
CH 221 Organic Chemistry I	4
CH 223 Organic Chemistry II	4
CH 315 Quantitative Analysis	4
CH 331 Intro. Physical Chemistry	4
CH 401 Systematic Inorganic Chemistry I	2
BCH, 451 Introductory Biochemistry	3
Chemistry Elective	3
	32

Supporting Courses	
BIO 125 General Biology	4
MA 141 Analytic Geom. & Calculus I	4
MA 241 Analytic Geom. and Calculus II	4
MEA 101 Geology I: Physical	3
MEA 110 Geology I: Lab	1
PY 205 Physics for Engr. & Sci. I	4
PY 208 Physics for Engr. & Sci. II	4
Biological Science Elective	3-4
Earth Science Elective	3-4
	30-32

Earth Sciences

Specializotion Courses	
MEA 101 Geology I:Physical	3
MEA 110 Geology I:Lab	1
MEA 102 Geology II:Historical	3
MEA 111 Geology II:Lab	1
MEA 130 Intro. to Weather & Climate or	
MEA 311 Physical Climatology	3
MEA 200 Intro. to Ocenaography	3
MEA 410 Intro. to Geologic Materials	4
MEA 451 Structural Geology	4
PY 123 Astronomy	3
Earth Science Electives	6-8
	31-33

Supporting Courses	
BIO 125 General Biology	4
CH 101 Chemistry - A Molecular Science	3
CH 102 General Chemistry Lab	1
CH 201 Chemistry - A Quantitative Science	3
CH 202 Quantitative Chemistry Lab	1
MA 131 Calculus for Life & Mgmt. Science A or	
MA 141 Analytic Geom. & Calculus I	3/4
MA 231 Analytic Geom. & Calculus B or	
MA 241 Analytic Geom. & Calculus II	3-4
PY 211 College Phyics I	4
PY 212 College Physics II	4
Biological Science Elective	3-4
	29-32

Physics (64-67)

Specialization Courses	
PY 201 University Physics I or	
PY 205 Physics for Engr. & Scientists I	4
PY 202 University Physics II or	
PY 208 Physics for Engr. & Scientists II	4
PY 203 University Physics III or	
PY 407 Intro. to Modern Physics	3-4
PY 123 Astronomy	3
Physics Electives	16-17
(Recommended: PY 228, PY 411, PY 413,	**30-32**
PY 414, and PY 452)	

Supporting Courses	
BIO 125 General Biology	4
CH 101 Chemistry - A Molecular Science	3
CH 102 General Chemistry Lab	1
CH 201 Chemistry - A Quantitative Science	3
CH 202 Quantitative Chemistry Lab	1
MA 141 Analytic Geom. & Calculus I	4
MA 241 Analytic Geom. & Calculus II	4
MA 242 Analytic Geom. & Calculus III	4
MA 341 Applied Diff. Equations	3
MEA 101 Geology I:Physical	3
MEA 110 Geology I:Lab	1
Biological Science Elective	3-4
	34-35

Professional Studies (29 semester hours)
(required of all students)

ECI 416 Tchng Excep Students Mainstrmed Clssrm	3
ED 310 Tutoring Adolescents	1
ELP 344 School and Society	3
EMS 101 Orientation to Math and Science Education	0
EMS 203 Intro. to Teaching Mathematics and Science	3
EMS 475 Methods of Teaching Science[6]	3
EMS 476 Student Teaching in Science[6]	8
EMS 477 Instructional Materials in Science[6]	3
EMS 495 Senior Seminar in Math & Science Education[6]	2
PSY 476 Psychology of Adolescent Dev.	3
	29

Minimum Hours Required for Graduation: 128

[1]Must be chosen from the university's list for approved humanities and social sciences courses.
[2]At least one of the indicated courses must be chosen from the Non-English speaking cultures list.
[3]Social Science elective cannot be a Psychology course.
[4]Chosen from HI 321, HI 322, HI 341, HI 480, HI 481, PHI 340, MDS 301.
[5]Chosen from ANT 252, COM/ANT/HSS 392, SOC 305, ECI 305.
[6]Taken together as a block in the Fall only. Student teaching is full-time for 10 weeks.

MIDDLE SCHOOL SCIENCE (WITH MATHEMATICS): GRADES 6-9 LICENSURE

J. C. Park, *Coordinator*

REQUIREMENTS

General Studies (55 semester hours)	**Credits**
English and Communication Courses	
ENG 111 Comp. and Rhetoric	3
ENG 112 Comp. and Reading	3
COM 110 Public Speaking	3
	9
Mathematics Courses	
MA 131 Calculus for Life & Mgmt. Science A or	
MA 141 Analytic Geom. and Calculus I	3/4
MA 231 Analytic Geom. and Calculus B or	
MA 241 Analytic Geom. and Calculus II	3-4
	6-8
Physical Education	
Any 100-level PE in Fitness & Wellness	1
Physical Education Elective	1
PEH 280 Responding to Emergencies or	
PEH 285 Personal Health	2
	4

Humanities and Social Sciences Courses	**Credits**
Literature Elective[1,2]	3
History Elective[1,2]	3
Phil., Relig., Vis/Perf. Arts Elective[1,2]	3
Humanities/Social Science Elective[1,2]	3
Sci./Tech/Soc. Elective(HI 321, 322, 341, 480, 481; PHI 340; MDS 301)	3
PSY 304 Educational Psychology	3
Multicultural Elective[2](ANT 252, COM/ANT/HSS 392, SOC 305, ECI 305)	3
Social Science Elective[1,2,3]	3
	24

Teaching Major (38 semester hours)	
BO 200 Plant Life or ZO 201 General Zoology	4
BIO 125 General Biology	4
CH 101 Chemistry - A Molecular Science	3
CH 102 General Chemistry Lab	1
CH 201 Chemistry - A Quantitative Science	3
CH 202 Quantitative Chemistry Lab	1
MA 114 Intro. to Finite Mathematics	3
MA 225 Foundations of Advanced Mathematics	3
MA 308 College Geom.	3
MEA 101 Geology I:Physical	3
MEA 110 Geology Lab	1
BO 360/365 Ecology/Lab	3-4
PY 131 Conceptual Physics	4
PY 123 Astronomy	3
MEA 130/131 Weather & Climate/Lab	3-4
ST 311 Intro. to Statistics	3
Science Elective	2
	47-49

Professional Studies (35 semester hours)	
ECI 306 Middle Years Reading	3
ECI 309 Teaching in the Middle Years	3
ECI 416 Teaching Excep Students Mainstreamed Classrm	3
ED 310 Tutoring Adolescence	1
ELP 344 School and Society	3
EMS 101 Orientation to Math and Science Education	0
EMS 203 Intro. to Teaching Mathematics and Science	3
EMS 475 Methods of Teaching Science	3
EMS 476 Student Teaching in Science	8
EMS 477 Instructional Materials in Science	3
EMS 495 Senior Seminar in Math and Science Education	2
PSY 476 Psychology of Adolescent Dev.	3
	35

Minimum Hours Required for Graduation: 128

[1]Must be chosen from the university's list for approved course in this area.
[2]At least one of the indicated courses must be chosen from the Non-English speaking cultures.
[3]Cannot be a psychology course.

CURRICULA IN TECHNOLOGY EDUCATION
Degree Earned: B.S. in Technology Education
502 Poe Hall

W. J. Haynie III, *Coordinator*

LICENSURE OPTION

FRESHMAN YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
EOE 101 Intro. to Occ. Education	1	ENG 112 Comp. and Reading	3
ENG 111 Comp. and Rhetoric	3	Math., Statistics, or Logic[1]	3
GC 120 Foundations of Graphic Comm.	3	Humanities/Social Science Elective[2,5]	3
Math Elective	3	Natural Sciences--Basic[3]	3-4
TED 115 Wood Processing	4	TED 122 Metal Technology	4
Any 100-level PE in Fitness & Wellness	1		15-16
	15		

SOPHOMORE YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
EOE 207 Intro. to Teaching Occ. Education	3	Humanities/Social Science Elective[2,4]	3
GC 200 Applied Computer Aided Drawing	3	Literature Elective[2]	3
Natural Science-Basic[3]	3-4	Natural Science Elective[3]	3-4
Speech Elective[2]	3	TED 221 Construction Technology	3
TED 246 Graphic Arts Technology	3	Physical Education Elective	1
	15-16		13-14

JUNIOR YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
ED 310 Tutoring Adolescents	1	History Elective[2]	3
ELP 344 School and Society	3	PSY 376 Developmental Psychology[2]	3
Math, Natural Science, or STS Elective	3	TED 461 Comm. Technology	3
PSY 304 Educational Psychology[2]	3	TED 384 Computer Applications in Industry	3
TED 359 Electrical Technology I	3	Free Elective	3
TED 376 Transportation:Enrgy & Pwr Tchnlgy	3		**15**
	16		

SENIOR YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
Econ., Soc, Pol & Gov, Anth, or Cult Geog[2]	3	EOE 452 Lab Planning in Technology Education	3
ECl 451 Improving Rdng in Secondary Schools	2	EOE 457 Student Teaching in Technology Ed.	8
EOE 456 Curr. & Methods in Technology Ed.	3	EOE 495 Senior Seminar in Technology Ed.	3
TED 430 Mfg. Technology	3		**14**
Free Electives	6		
	17		

Minimum Hours Required for Graduation: 121[6]

Notes:
1.From approved list of Mathematics, Statistics, and Logic courses.
2.Part of the Second Academic Concentration--Multidisciplinary Studies in Humanities and Social Sciences (code 4903).
3.Three courses (11 credits) from natural sciences including two from different basic sciences (biology, chemistry, earth sciences, or physics--see approved list). Two of these three courses must have a lab.
4.Must focus on a non-English speaking culture.
5.One of these courses must be selected from either the STS-Humanities and Social Science Perspective List or the STS-Science and Technology Perspective List.
6.Foreign language proficiency at the FL 102 level or above must be demonstrated prior to graduation.

NON-LICENSURE OPTION

FRESHMAN YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
EOE 101 Intro. to Occ. Education	1	ENG 112 Comp. and Reading	3
ENG 111 Comp. and Rhetoric	3	Math., Statistics, or Logic[1]	3
GC 120 Foundations of Graphic Comm.	3	Humanities/Social Science Elective[5]	3
Math Elective	3	Natural Sciences--Basic[2]	3-4
TED 115 Wood Processing	4	TED 122 Metal Technology	4
Any 100-level PE in Fitness & Wellness	1	Physical Education Elective	1
	15		**17-18**

SOPHOMORE YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
EOE 207 Intro. to Teaching Occ. Education	3	Humanities/Social Science Elective[3]	3
GC 200 Applied Computer Aided Drawing	3	History or Literature Elective	3
Natural Science--Basic[2]	3-4	Natural Science Elective[2]	3-4
Adv Writing, Comm/Speech, or Adv FL	3	TED 221 Construction Technology	3
TED 246 Graphic Arts Technology	3	Free Elective[3]	3
	15-16		**15-16**

JUNIOR YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
EC 201 Prin. of Microeconomics	3	History or Literature Elective	3
ELP 344 School and Society	3	Psychology Elective	3
Math, Natural Science, or STS Elective	3	TED 461 Comm. Technology	3
Psychology Elective	3	TED 384 Computer Applications in Industry	3
TED 359 Electrical Technology I	3	BUS 360 Marketing Methods	3
TED 376 Transportation:Enrgy & Pwr Tchnlgy	3		**15**
	16		

SENIOR YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
TED 430 Mfg. Technology	3	EOE 452 Lab Planning in Technology Ed.	3
Economics or Business Elective	3	EOE 307 Field Work in OED	6
Advised Technical Elective[4]	3	EOE 495 Senior Seminar in Technology Ed.	3
Free Elective	3		**12**
Free Elective	3		
	15		

Minimum Hours Required for Graduation: 122[6]

Notes:
[1]From approved list of Mathematics, Statistics, and Logic courses.
[2]Three courses (11 credits) from natural sciences including two from different basic sciences (biology, chemistry, earth sciences, or physics--see approved list). Two of these three courses must have a lab.
[3]Must focus on a non-English speaking culture.
[4]From TED, GC, MA, Sciences, Design, or Engineering.
[5]One of these courses must be selected from either the STS-Humanities and Social Science Perspective List or the STS-Science and Technology Perspective List.
[6]Foreign language proficiency at the FL 102 level or above must be demonstrated prior to graduation.

MINOR IN GRAPHIC COMMUNICATIONS
Poe Hall, Room 510
Phone: (919) 515-1754

A. Y. Scales, *Coordinator*

This 15 hour minor develops competencies in selecting and applying graphic techniques in both career and leisure activities, provides in-depth manual and computer skills, and enriches visual perception and critical thought in graphic areas. Minor programs are individually designed to meet the needs of the student's major, such as in engineering or technology education.

SOCIAL STUDIES TEACHER EDUCATION
528 Poe, Box 7801
Phone: (919) 515-9655

K. A. Troost, *Coordinator of Advising, Sociology*
G. Surh, *Coordinator of Advising, History*
K. Vickery, *Coordinator of Advising*
J. H. Gilbert, *Coordinator of Advising, Political Science*

Students desiring to become secondary social studies teachers in grades 9-12 will be enrolled in the College of Humanities and Social Sciences. Curriculum requirements for the teacher education options can be found under history, political science and public administration, and sociology and anthropology in that College's section. Students desiring to become social studies teachers in grades 6-9 will be enrolled in the College of Education and Psychology.

SPANISH TEACHER EDUCATION

L. Salstad, *Coordinator of Advising*

Students desiring to become teachers of Spanish will be enrolled in the College of Humanities and Social Sciences. The curriculum requirements for the teacher education option is Spanish can be found under Foreign Languages and Literatures in that College's section.

DEPARTMENT OF PSYCHOLOGY

www2.ncsu.edu/ncsu/cep/Psychology/Psychology.html

Poe Hall, Room 640
Phone: (919) 515-2251

D.W. Martin, *Head and Coordinator of Advising*
S. S. Snyder, *Associate Head*

Alumni Distinguished Undergraduate Professors: K.W. Klein, D.H. Mershon, S.S. Snyder;*Professors:* J.W. Cunningham, D.W. Drewes, W.P. Erchul, D.O. Gray, T.M. Hess, J.W. Kalat, T.E. LeVere, J.E.R. Luginbuhl, R.W. Nacoste, D.W. Martin, D.H.Mershon, J.J. Michael, S.E. Newman, F.J. Smith, B.W. Westbrook; *Adjunct Professors:* J.L. Howard, W. Tornow, L.G. Tornatsky; *Professors Emeriti:* K.L.Barkely, J.C. Johnson, H.G.Miller, P.W. Thayer, *Associate Professors:* L.E. Baker-Ward, C.C.Brookins, S.A. Converse, A.G. Halberstaldt, P.F. Horan, M.E. Haskett, K.W. Klein, S.B.Pond, A.C. Shulte, M.A. Wilson, M.S. Wogalter; *Adjunct Associate Professors:* B.A. Braddy-Burrus, B.F. Corder, A.D. Hall;*Associate Professors Emeriti:* J.L. Cole, R.F. Rawls; *Clinical Assistant Professors:* M.Y. Bingham, P.W. Collins;*Adjunct Assistant Professors:* B.H. Beith, J.W. Fleenor, C.L. Kronberg, C.E. Lorenz, S.N. Palmer, B.H. Rogers; *Associate Members of the Faculty:* C.D. Korte (Multidisciplinary Studies), R.G. Pearson (Industrial Engineering), J.L.Wasik (Statistics).

Psychology is one of the basic majors in liberal arts and sciences. Psychologists use the methodology of science to study human behavior and experience. A bachelor's degree in psychology forms an excellent foundation for careers in business and government, as well as enhancing life skills such as parenting and human social interaction. Students can also use this degree as an entry into further education leading to an advanced degree in applied or experimental psychology, or to such fields as law, medicine, business or social work.

There are two programs for undergraduate majors in psychology: The General Option (PSY) and Human Resource Development (HRD). Each emphasizes different aspects of psychology. Separate descriptions of these programs are included in the next section.

HONORS PROGRAMS
Within the General Option and the Human Resource Option, there are honors tracks which provide special curricula and opportunities to work with faculty on research projects. Students must have completed a minimum of 45 semester hours of course work (at least 15 at NC State) and have a grade point average of 3.250 or better to be considered for admission to an honors program. More details as to admission and requirements are available from the Psychology Department.

All undergraduate majors are members of the Psychology Club, which provides a number of enrichment activities, including sponsorship of the Carolinas Psychology Conference. One of the largest undergraduate conferences in the United States, it is held annually in cooperation with Meredith College and other Cooperating Raleigh Colleges. There is also an active chapter of Psi Chi, the national psychology honor society, which provides enrichment to the program.

CURRICULUM IN PSYCHOLOGY - GENERAL OPTION

The General Option is oriented toward the student who wants a broad understanding of the types of problems with which psychology is concerned and the ways in which psychologists approach and attempt to solve these problems. Curriculum requirements in the General Option are sufficiently flexible for students to concentrate, if they wish, in another area of study as well as psychology, and thereby prepare themselves for a variety of careers or professional programs. By wise choice of elective courses, a student can prepare for medical, legal, business, or education graduate training, while at the same time acquiring a basic background in the social sciences.

CURRICULUM IN PSYCHOLOGY, GENERAL OPTION

Degree Earned: B.A. in Psychology

FRESHMAN YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
BIO 105/106 Biology in Modern World	4	ENG 112 Comp. & Reading	3
ENG 111 Comp. and Rhetoric	3	Social Science Elective[2]	3
PSY 200 Intro. to Psychology	3	Natural Science Elective[3]	3-4
Mathematics Elective[1]	4	Philosophy Elective[4]	3
Any 100-level PE course in Fitness & Wellness	1	Physical Education Elective	1
	15	Free Elective	3
			16-17

SOPHOMORE YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
PSY 240 Intro. to Behavioral Research I	3	CSC 200 Intro. to Computers & Their Uses	3
PSY 241 Intro. to Behavioral Res. I Lab	1	PSY 242 Intro. to Behavioral Research II	3
Humanities/Social Science Elective[5]	3	PSY 243 Intro. to Behavioral Res.II Lab	2
Literature Elective[6]	3	Humanities/Social Science Elective[5]	3
Mathematics Elective[1]	3-4	Natural Science Elective[3]	3-4
	13-14	Philosophy Elective (restricted)[7]	3
			17-18

JUNIOR YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
PSY Elective[8]	3	PSY-Group 1[9]	3
PSY-Group 1[9]	3	PSY-Group 2[13]	3
Restricted Elective[10]	3	Literature Elective[6]	3
Speech or Technical Writing Elective[11]	3	Restricted Elective[10]	3
Sci./Technology/Soc.Elective[12]	3	Free Elective	3
	15		**15**

SENIOR YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
PSY-Group 2[13]	3	PSY-Group 2[13]	3
PSY Elective[8]	3	Restricted Elective[10]	3
Restricted Elective[10]	6	Free Electives	6-9
Free Elective	3		**12-15**
	15		

Minimum Hours Required for Graduation: 122

[1]Any two MA prefix courses from the approved GER Mathematics Electives list.
[2]Taken from approved GER lists of Electives in Economics, Politics and Government, Sociology, Anthropology, or Cultural Geography. This course or one of the two Humanities or Social Science Electives must focus on a non-English speaking culture (see Footnote 5).
[3]Two courses (at least one of which is NOT a biological science) from the GER Natural Sciences (Biology, Chemistry, Earth Science, Physics) List. At least one of these must include a lab experience. GN 301, GN 411, MB 200, and ZO(MEA) 220 are considered biological sciences that meet this requirement.
[4]Taken from the approved GER Philosophy Electives list.
[5]Taken from the GER Electives lists in Cultural Geography, Economics, History, Politics and Government, Sociology, or Anthropology, or from the approved subset of the Humanities and Social Sciences Additional Electives List. One of these courses or the Social Science Elective must focus on a non-English speaking culture (see Footnote 2).
[6]Taken from the approved GER Literature Electives list.
[7]Taken from LOG 201,or PHI 311, 332, 335 or 340, or CSC(MA)222.
[8]Any course taught in the Psychology Department.
[9]Taken from PSY 400, 410, 420, 430, 591.
[10]Chosen in consultation with Advisor from list of Psychology Department Approved Restricted Electives.
[11]Taken from ENG 331, 332, 333 or COM 110, 112, 201, or 202.
[12]Taken from approved GER Science, Technology, and Soc. (Science and Technology Perspective) list.
[13]Group 2 Psychology Electives are three courses, one course from three of the following five categories: I. PSY 307 or 340; II. PSY 376, 475, or 476; III. PSY 370, 470; IV. PSY 311 or 312; V. PSY 436.

MINOR IN COGNITIVE SCIENCE

The Departments of Psychology, and Philosophy and Religion offer an interdisciplinary minor in cognitive science. The minor provides a general introduction to contemporary interdisciplinary research within the framework of the "computer model" mind, and offers the student the opportunity for in-depth study of selected topics of such as the nature of human information processing, the acquisition and use of lamachine intelligence.

To complete the minor, 15 hours are required, distributed as follows: PSY 320 (Cognitive Processes); PSY 340 (Ergonomics) or PSY 744 (Human Information Processing); PHI 331 (Philosophy of Language); PHI 332 (Philosophy of Psychology); PHI/PSY 425/525 (Introduction to Cognitive Science).

MINOR IN PSYCHOLOGY

The Psychology Department offers a minor in psychology to majors in any field except psychology. To complete the minor, eighteen hours of courses are required, six of these hours in the basic science of psychology, and nine in the applied aspects of psychology. PSY 200 is a required prerequisite. All must be passed with a grade of "C" or better.

CURRICULUM IN PSYCHOLOGY
HUMAN RESOURCE DEVELOPMENT

The Human Resource Development (HRD) Option is designed to provide a groundwork of skills and experience for students who wish to enter human service careers with a B.A. degree. With appropriate curriculum modifications, the program can also provide a sound background for students who wish to go into advanced degree programs in psychology, management, personnel, social work, counseling, guidance, education, and other areas. Students interested in graduate school should confer with their advisors in order to plan an appropriate course of study.

The HRD Option focuses on enabling students to gain direct experience in the areas in which they would like to work. HRD students devote a semester to learning principles and skills related to working with human problems, and subsequently each HRD student spends a semester working part-time or full-time in a job related to his/her own area of interest. The HRD Option accepts a maximum of 20 students each year. Interested students already in the general option can apply for admissions to HRD during the spring semester of their sophomore or junior year. Further information about the HRD option is available through the Psychology Department office.

CURRICULUM IN PSYCHOLOGY, HUMAN RESOURCE DEVELOPMENT OPTION
Degree Earned: B.A. in Psychology

FRESHMAN YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
BIO 105/106 Biology in Modern World	4	ENG 112 Comp. & Reading	3
ENG 111 Comp. and Rhetoric	3	Social Science Elective[2]	3
PSY 200 Intro. to Psychology	3	Natural Science Elective[3]	3-4
Mathematics Elective[1]	4	Philosophy Elective[4]	3
Any 100-level PE course in Fitness & Wellness	1	Physical Education Elective	1
	15	Free Elective	3
			16-17

SOPHOMORE YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
PSY 240 Intro. to Behavioral Research I	3	CSC 200 Intro. to Computers & Their Uses	3
PSY 241 Intro. to Behavioral Res. I Lab	1	PSY 242 Intro. to Behavioral Research II	3
Humanities/Social Science Elective[5]	3	PSY 243 Intro. to Behavioral Res.II Lab	2
Literature Elective[6]	3	Humanities/Social Science Elective[5]	3
Mathematics Elective[1]	3-4	Natural Science Elective[3]	3-4
	13-14	Philosophy Elective (restricted)[7]	3
		Physical Education Elective	1
			17-18

JUNIOR YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
PSY 350 Human Res. Dev. Skills	3	PSY 495 HR Dev. Practicum	3
PSY 495 HR Dev. Practicum	3	PSY 499 Indep. Study in Psy.	4
Restricted Elective[9]	3	Literature Elective[6]	3
Speech or Technical Writing Elective[10]	3	COM 112 Interpersonal Comm.	3
Sci./Technology/Soc.Elective[11]	3	PSY 312	3
	15		**16**

SENIOR YEAR

Fall Semester	*Credits*	*Spring Semsester*	*Credits*
PSY Electives[8]	6	PSY Elective[8]	3
Restricted Electives[9]	6	Free Electives	9
Free Elective	3		**12**
	15		

Minimum Hours Required for Graduation: 122

[1]Any two MA prefix courses from the approved GER Mathematics Electives list.
[2]Taken from approved GER list of Economics, History, Politics and Government, Sociology, Anthropology, or Cultural Geography. This course or one of the two Humanities or Social Science courses must focus on a non-English speaking culture (see Footnotes).
[3]Two courses(at least one of which is not a biological science) from the GER Natural Sciences (Biology, Chemistry, Earth Sciences, and Physics) list. At least one of these must include a lab experience. GN301, GN 411, MB 200, and ZO(MEA)220 are also accepted and are considered a biological science in

meeting this requirement.
[4] Taken from the approved GER Philosophy Electives list.
[5]Taken from GER Electives lists in Economics, History, Politics and Government, Sociology, or Anthropology, or from the approved subset of the Humanities and Social Sciences Additional List. One of these courses or the Social Science Elective must focus on a non-English speaking culture (see Footnote 2)
[6] Taken from the approved GER Literature Electives list.
[7]Taken from LOG 201, or PHI 311, 321, 332, 335, 340 or CSC(MA)222.
[8]Any course taught in the Psychology Department.
[9]Chosen in consultation with Advisor from list of Psychology Department Approved Restricted Electives.
[10]Taken from ENG 331, 332, 333 or COM 110, 201, or 202.
[11]Taken from approved GER Sci., Technology, and Soc. Elective (Science and Technology Perspective) list.

COLLEGE OF ENGINEERING

118 and 120 Page Hall
NCSU Box 7904
Raleigh, NC 27695-7904

Phone: *(919)515-2315*
Fax: *(919)515-8702*
E-mail: *engineering@ncsu.edu*

N. A. Masnari, *Dean*
S. A. Rajala, *Associate Dean for Academic Affairs*
J. G. Gilligan *Associate Dean for Research and Graduate Programs*
T. K. Miller, *Assistant Dean for Distance Education and Information Technology*
G. Lee, *Assistant Dean for Research Programs*
T. L. Mitchell, *Assistant Dean for Engineering Student Services*
R. L. Porter, *Assistant Dean for Academic Affairs*

Men and women who seek a challenging technical career in research and development, design, construction, production, maintenance, technical sales, management, teaching, or other careers requiring a methodical, creative solution of problems, should consider an engineering or computer science education. At NC State, the College of Engineering has a distinguished and internationally recognized faculty. The faculty, together with the curricula of the undergraduate and graduate programs, offer an opportunity for ambitious men and women to become the leaders and prime movers of our increasingly technological world. Because of the great influence of science and technology on our everyday lives, today's engineers and computer scientists must be acutely aware of, and responsible for, the impact that their creations may have on society. In addition to safety, aesthetics, economics, and energy, today's technologist must consider environmental, sociological, and other "human concern" costs.

The college's 30,000 graduates may be found in widely diversified careers throughout the world. Most are practicing in the engineering profession, but because their education has equipped them well to deal with problems in a wide variety of fields, many College of Engineering graduates have become corporate presidents, leaders in government, lawyers, and medical doctors, to name a few.

The College of Engineering is organized into ten departments. Biological and Agricultural Engineering; Chemical Engineering; Civil Engineering; Computer Science; Electrical and Computer Engineering; Industrial Engineering; Material Science and Engineering; Mechanical and Aerospace Engineering; Nuclear engineering; and Textile Engineering, Chemistry and Science. Sixteen undergraduate degree programs are offered in these ten departments. In addition, a degree program in Engineering is offered by special arrangement to the very few students who can clearly demonstrate the need for an individualized program of study. All departments also offer advanced studies leading to professional degrees, master's degrees and the Doctor of Philosophy degree. (Consult the *Graduate Catalog* for graduate degrees.)

The College of Engineering requests and receives accreditation from the Engineering Accreditation Commission of the Accrediting Board for Engineering and Technology (ABET) for thirteen of its undergraduate engineering degree programs. These are aerospace engineering, biological engineering, chemical engineering, civil engineering, civil engineering-construction option, computer engineering, electrical engineering, environmental engineering, industrial engineering, industrial engineering—furniture manufacturing, materials science and engineering, mechanical engineering, nuclear engineering, and textile engineering. The program in computer science is accredited by the Computer science Accreditation Commission (CSAC) of the Computing Sciences Accreditation Board (CSAB). Accreditation insures that these programs satisfy requirements for acceptance by these nationally recognized agencies. All curricula and programs are designed to maintain the college's national and international reputation while meeting the needs of the people and industries of the state and region through effective instruction, competent research, and the development of new and meaningful contributions to scientific knowledge.

A Career Planning and Placement Center is maintained by the university to assist continuing students and graduating students in achieving their career goals.

DEGREES

Entering students receive assistance in planning an appropriate program of study and have available continued guidance from academic advisors throughout their academic careers. Beginning freshmen are enrolled in the Engineering Undesignated program for one to two years. After successfully completing Engineering Undesignated requirements, students may be admitted to a specific department. In order to be eligible to apply for admission into a degree program, Engineering Undesignated students must successfully complete at least 28 credit hours, including the following courses: MA 141 and MA 241; PY 205; ENG 111; E 115; CH 101, CH 102, and one of either CH 201 or CSC 110/112/114.

Prerequisite requirement for all engineering courses-Before a student in the College of Engineering may enroll in a 200 or higher level engineering course, the student must have earned a grade of "C" or higher in ENG 111, MA 141, MA 241, PY 205, CH 101, and CH 102, and the student must have successfully completed E 115, and one of either CH 201, CSC 110, CSC 112, or CSC 114.

Bachelor of Science-The baccalaureate program provides preparation for entry into industry, government, business or private practice as well as graduate school. Graduates with a BS degree in engineering or computer science may be engaged in design development, production, construction, sales, maintenance, or the planning, operation or management of industrial units.

The undergraduate curricula offer programs of study leading to bachelor's degrees in aerospace engineering, biological engineering, chemical engineering, civil engineering, civil engineering-construction option, construction management, computer engineering, computer science, electrical engineering, environmental engineering, industrial engineering, industrial engineering-furniture manufacturing option, materials science and engineering, mechanical engineering, nuclear engineering, and textile engineering. Graduation requirements include completion of one of the sixteen curricula with an overall grade point average of 2.0 and a grade point average of 2.0 in the major courses. The total number of required credits ranges from 120 to 128 semester hours.

DOUBLE DEGREE PROGRAMS

NC State students may wish to earn Bachelor of Science degrees in two fields of engineering and in computer science and an engineering field. When the two courses of study are planned early and carefully, a number of courses can simultaneously satisfy requirements in both degrees. Humanities, social science, physics, mathematics, chemistry, English and physical education sequences are common to most curricula. In addition, required courses in one

curriculum can sometimes be uses as electives in another field. A well-planned double degree program can be completed in five years. Students interested in such a program should consult the Assistant Dean for Student Services.

Under the BSEE/MSM Program, students may earn a Bachelor of Science degree in Electrical Engineering and a Master of Science in Management during a five-year course of carefully planned study.

Under the BSCHE/MSN Program, students may earn a Bachelor of Science degree in Chemical Engineering and a Master of Science in Management during a five-year course of carefully planned study.

Other students may wish to combine a bachelor of science in engineering or computer science with a Bachelor of Science or Bachelor of Arts degree in another college or school at North Carolina State University. Here also, a number of courses required for one degree may also satisfy requirements for a second degree. When the two courses of study are planned early and carefully, a double-degree program can be completed in as few as five years. Students interested in such a program should contact the Assistant Dean for Student Services.

STUDENT ACTIVITIES

Each curriculum in the College of Engineering has a technical society open to every student enrolled in the curriculum. In most cases, these are student chapters of national professional organizations. Each curriculum also has one or more honor societies to give recognition to students who have earned superior academic records. In addition, there are college-wide honor, professional, and service societies that offer personally and educationally rewarding opportunities for students.

Student representatives of each curriculum serve on the Engineers' Council. The Council is coordinating agency for college-wide activities such as the Engineering Fundamentals Examination review classes, the Engineers' Week Exhibition, the annual St. Patrick's Day Dance, and the *N.C. State Engineer* student publication.

HUMANITIES AND SOCIAL SCIENCES

Each student in the College of Engineering is required to take a minimum of 21 credit hours of humanities and social science courses. **At least one course used to fulfill the requirements must be selected from the list of courses which focus on a non-English speaking culture.** All of the courses used to satisfy the humanities and social science requirement must be taken from the College of Engineering list of approved courses and all must be completed with regular grading. The courses will be distributed as designated below:

1. Select a beginning economics course, EC 201 or ARE 201.
2. Select two courses from the list of history courses from the list of literature courses. At least one course must be at the advanced level. History courses must be selected from the same group and literature courses must be taken from the same language.
3. Select one course from the list of philosophy, religion, and visual/performing arts courses.
4. Select one course from the list of science, technology, and society courses.
5. Select one course from the following social science areas: anthropology, cultural geography, politics and government, psychology, or sociology.
6. Select one advanced course from the following social science areas: anthropology, economics, politics and government, psychology, or sociology. The advanced course must be selected from an area in which an introductory course has been completed.

COOPERATIVE EDUCATION PROGRAM

This optional program is structured so that the student will alternate semesters of study with semesters of practical work as sophomores and juniors. The freshman and senior years are spent on campus, while sophomore, junior academic work is spread over a three-year period to permit alternating academic semesters with work-experience semesters. Students earn a salary while they are in industry, and they may earn a sufficient income to finance much of their college education. The co-op plan can be completed in five years, during which time the student receives 12 to 18 months of industrial experience.

Students in all curricula in the College of Engineering may apply for the co-op program if they have a grade-point average of 2.25 or better. After a student has been accepted for employment, he or she is expected to maintain at least a 2.0 grade-point average. Application for admission into the co-op program should be made early in the spring semester of the freshmen year; however, later applications resulting in fewer work semesters prior to graduation will be considered during the sophomore year or the first semester of the junior year. Engineering Undesignated students must be admitted into an engineering degree program prior to beginning the first co-op assignment. Further information may be obtained from the Office of Cooperative Education, 212 Peele Hall.

HONORS AND SCHOLARS PROGRAMS:

ENGINEERING SCHOLARS PROGRAM

The Engineering Scholars Program has as its goal the promotion of research and academic careers in engineering and computer science. Under the sponsorship of the of the College of Engineering, in cooperation with the Division of Student Affairs, Scholars begin by living together and participating in special educational seminars, cultural enrichment activities, and special Scholars sections in some courses. In the sophomore year, engineering Scholars may begin research apprenticeships with faculty members throughout the College of Engineering. Additional information may be obtained by contacting departmental program representatives.

BENJAMIN FRANKLIN SCHOLARS PROGRAM

A limited number of freshmen in the College of Engineering are selected to participate in the Benjamin Franklin Scholars program. In addition to their major courses, each Benjamin Franklin Scholar develops an individualized, five-year plan of work focused on a central theme in the humanities and social sciences. Students completing the program receive a Bachelor of Science in an engineering discipline or computer science and a Bachelor's degree in multidisciplinary studies.

This double-degree program provides a unique opportunity to integrate a solid base of knowledge in technology or science with a broad philosophical perspective of the humanities. The curriculum for the double-degree program has four main components: (1) a strong general education, (2) specially designed interdisciplinary and problem-defining courses, (3) all technical course requirements associated with the engineering or computer science degree, and (4) a thirty-hour multidisciplinary concentration designed by students in consultation with their advisors. With careful planning, this program can be completed in five years.

For more information, contact the Assistant Dean for Academic Affairs in the College of Engineering (118 Page Hall), or the Assistant Dean for Undergraduate Affairs in the College of Humanities and Social Sciences (106 Caldwell Hall).

COMPUTERS
During their first semester, new freshmen in the College enroll in a computer literacy course, E 115, which is taught using the EOS student computing facility. Following completion of E 115, it is expected that students will incorporate use of EOS workstations into all curricular areas, including the preparation of reports and papers in non-technical subjects. In either the freshman or sophomore year, most students will complete a course in computer programming and, thereafter, will increasingly use computers as an engineering tool. The College policy is that all of its students will be provided with the computing resources required to successfully complete their course of study. However, some students may find that owning a computer is beneficial in terms of convenience and ready access to computational capability. Since different departments within the College have different course and computer language requirements, the College recommends that new students who decide to purchase a personal computer should not do so until they have been admitted into a degree program.

INTERNATIONAL ACTIVITIES
The College is actively working to provide its students with opportunities for overseas work and study experience. In addition to the study abroad program which is available to all students at NCSU, College of Engineering students can participate in an exchange program with the Universite' de Technology de Compe`gne, France. Alternatively, through the College of Textiles, students interested in France can participate in an exchange program at the Catholic University of Lille, France. Students interested in Japan can participate in one of several programs offered by EAGLE, the Engineering Alliance for Global Education.

TRANSFER PROGRAM
Students with non-engineering degrees or one or more years of academic work completed at other institutions may apply for transfer admission to the College of Engineering through the University Admissions Office. Students are admitted from appropriate programs from four-year institutions, as well as junior and community colleges.

Students currently attending or anticipating attendance at other institutions are advised to contact the Assistant Dean for Student Services for information regarding admission to NC State and credit for courses taken elsewhere.

PROFESSIONAL DEGREES IN ENGINEERING
The College of Engineering offers post-baccalaureate curricula leading to the degrees of Aerospace engineer, Civil Engineer, and Mechanical Engineer. These programs of study are designed to fit the needs of students desiring intensive specialization in a particular field, or additional work not ordinarily covered in the normal undergraduate curricula.

DEPARTMENT OF BIOLOGICAL AND AGRICULTURAL ENGINEERING

http://www.bae.ncsu.edu/

David S. Weaver Laboratories (Room 100)
Phone: (919) 515-2694

D. B. Beasley, *Head*
R. O. Evans, Jr., *Department Extension Leader*
J. H. Young, *Director of Graduate Programs*
C. G. Bowers, Jr., *Undergraduate Coordinator*

Distinguished University Professor and William Neal Reynolds Professor: R.W. Skaggs;*Professors:* C.F. Abrams Jr., J.C. Barker, D.B. Beasley, R.W. Bottcher, C.J. Bowers Jr., F.J. Humenik, E.G. Humphries, W.H. Johnson, G.J. Kriz, W.F. McClure, R.P. Rohrbach, A.R. Rubin, R.S. Sowell, L.F. Strikeleather, P.W. Westerman, T.B. Whitaker (USDA), D.H. Willits, J.H. Young;*Adjunct Professors:* F.E. Barton II, L.M. Safley Jr., S.S. Schiffman, L.M. Sykes; *Professors Emeriti:* G.B. Blum Jr., H.D. Bowen, J.W. Dickens, L.B. Driggers, J.M. Fore, G.W. Giles, E.L. Howell, F.M. Richardson, R.E. Sneed, C.W. Suggs, R.W. Watkins, E.H. Wiser; *Associate Professors:* G.R. Baughman, S.M. Blanchard, M.D. Boyette, R.O. Evans, Jr., R.L. Huffman, G.D. Jennings, J.E. Parsons; *Visiting Associate Professors:* G.T. Roberson, J. Spooner; *Assistant Professors:* J. Cheng, J.J. Classen, S.A. Hale; *Research Assistant Professors:* D.M. Amatya, G.M. Chescheir, S.K. Leihr, *Visitint Assistant Professor:* G.L. Grabow, *Adjunct Assistant Professors:* D.D. Archibald, R.L. Langley, S.K. Seymour; *Senior Researcher:* S.C. Mohapatra;*Extension Specialists:* E.J. Hewitt, III, W.F. Hunt, D.E. Line, R.L. McLymore, J.M. Rice, R.E. Sheffield, R.L. Sherman; *Associate Members of the Faculty:* C.R. Daubert (Food Science), B.E. Farkas (Food Science), A.E. Hassan (Forestry), K.M. Keener (Food Science), T.M. Losordo (Zoology), S.C. Roe (Companion Animal & Special Species Medicine), K.P. Sandeep (Food Science), K.R. Swartzel (Food Science).

The department offers a Bachelor of Science in Biological Engineering. Biological engineering "brings engineering to life". Students analyze, develop solutions to unique engineering problems involved with biological and agricultural systems. An area of concentration can be chosen whereby scientific and engineering principles are applied to diverse problems in a particular area. Examples of applications in areas of concentrations are biomechanical systems for biomedical applications; proper environmental management of soil and water resources; processing and marketing of food and fiber; and integrating machines, controls, and structures for biological and agricultural systems.

OPPORTUNITIES
Conceptualizing, designing, and developing systems for producing, processing and packaging a high quality food supply, maintaining a high quality environment, and improving the quality of life for people and animals will provide many opportunities for graduates of the biological engineering curriculum. Jobs can be in design, development, research, outreach or sales in public institutions and in industry. Examples include food engineers for food processing companies, biological engineers for biomedical companies, design engineers for agricultural equipment companies, and environmental engineers for government environmental agencies, industry or engineering consulting firms. This curriculum, accredited by the Engineering Accreditation Commission of the Accreditation Board for Engineering and Technology (ABET), also provides adequate training for post-graduate work leading to advanced degrees in Biological and Agricultural Engineering.

CURRICULA
The curriculum provides an educational program for students which uniquely prepares them for dealing with engineering problems in the biological and agricultural areas. Flexibility in the program allows the student to choose electives which may lead to concentrations in the areas of (1) agricultural engineering, (2) biomedical engineering,(3) bioprocess engineering, (4) environmental engineering, or an emphasis area designed by the student and his/her advisor. Emphasis is placed on basic science and engineering courses such as mathematics, physics, chemistry, mechanics, biology, soils, and thermodynamics which provide a sound background for the application of engineering to biological problems.

The program is jointly administered by The College of Engineering and The College of Agriculture and Life Sciences in order to assure quality of basic training in both engineering and the life sciences. Freshmen entering this curriculum should enroll in the College of Engineering undesignated program and indicate BEU as their curriculum choice. After successfully completing the Engineering undesignated requirements the student will enter the Biological and Agricultural Engineering Department in the BE curriculum.

CURRICULUM IN BIOLOGICAL ENGINEERING
Degree earned: B.S. in Biological Engineering

FRESHMAN YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
CH 101 Chemistry - A Molecular Science	3	CH 201 Chemistry - A Quantitative Science	3
CH 102 General Chemistry Lab	1	CH 202 Quantitative Chemistry Lab	1
E 100 Intro. to COE	0	ENG 112 Comp. & Reading	3
E 115 Intro. to Computing Environ	1	MA 241 Calculus II	4
ENG 111 Comp. & Rhetoric	3	PY 205 Physics for Engr. & Sc I	4
MA 141 Calculus I	4	Physical Education Elective	1
Humanities/Soc.Sci Elective[1]	3		16
Any 100-level PE in Fitness & Wellness	1		
	16		

SOPHOMORE YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
BAE 101 Intro. to BAE & Comp.	3	BAE 202 Intro. to BAE Methods	3
MAE 206 Engr. Statics[2] or		BAE(BIO) 235 Engr. Biology	3
CE 214 Engr. Mechanics-Statics	3	MAE 208 Engr. Dynamics[2] or	
MA 242 Calculus III	4	CE 215 Engr. Mechanics - Dynamics	3
PY 208 Physics for Engr. & Sci. II	4	MA 341 Applied Diff. Equations	3
Humanities/Soc.Sci. Elective[1]	3	MAE 301 Engr. Thermodynamics I	3
	17		15

JUNIOR YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
BAE 402 Transport Phenomena	3	BAE 315 Properties of Bio. Engr. Materials	3
BAE Elective[3]	3	BAE Elective[3]	3
MAE 308 Fluid Mechanics[2] or		ECE 331 Princ. Electr. Engr. I	3
CE 382 Hydraulics	3	MAE 314 Solid Mechanics[2]or	
CH 220 Organic Chemistry[4]	4	CE 313 Mechanics of Solids	3
ST 361 or ST 370 Statistics	3	Biol. Science Elective[5]	4
	16		16

SENIOR YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
BAE 401 Bioinstrumentation	3	BAE 452 Engr. Design II	3
BAE 451 Engr. Design I	2	Biol. Science Elective[5]	3
Engr. Sci. Elective[6]	3	Humanitites/Soc.Sci. Elective[1]	3
Ethics Elective[7]	3	Humanitites/Soc.Sci. Elective[1]	3
Humanities/Soc.Sci. Elective[1]	3	Humanities/Soc.Sci Elective[1]	3
Communication Elective[8]	3		15
	17		

Total Hours Required for Graduation: 128

[1]Eighteen (18) hours Humanities/Social Sciences from the College of Engineering approved courses(Requires EC 201,EC 205, or ARE 201)and guidelines for choosing courses plus three(3) hours for the Science, Technology and Society category.[7]
[2]Students should follow either the CE214-CE215-CE382-CE313 or MAE206-MAE208-MAE308-MAE314 sequence.
[3]Choose from: BAE 361, BAE 422, BAE 465, BAE 471, BAE 481.
[4]Students planning to go to medical school or to take BCH 451 should take CH 221 followed by CH 223.
[5]Choose from: ANS 150 or ZO 150 or ZO 160, ANS 201, ANS 205, ANS 230, ANS 324, ANS 402, ANS 403, ANS 404, BCH 451, BO 200, BO 277, BO 360, BO 421, COM 445, CS 200, CS 213, CS 318, CS 411, FOR 252, FS 402, FS 421, FW(ZO) 420, GN 411, HS 301, HS 421, HS 422, HS 431, HS 440, HS(FS) 462, MB 351, MB 352, MB 411, MB 412, PO 201, PO 322, PO 405, PO 420, PO 423, PO 425, SSC 200, SSC 370, SSC 461, ZO 212, ZO 250, ZO 260, ZO 410, ZO(BO) 414, ZO 419, ZO 421.
[6]Choose from: Any BAE elective[3], BAE 462, BAE 472/572, BAE 473/573, BAE 495, BAE 522, BAE 578, FS(BAE)585, IE (CSC) 441, IE 543, IE 544, MAE 510.
[7]Choose from: MDS 201, MDS 320, MDS 325, PHI 311, PHI 322. Satisfies Science, Technology and Society category of the General Education Requirements.
[8]Choose from: COM 110, ENG 331, ENG 333.

CURRICULUM IN BIOLOGICAL ENGINEERING, Agricultural Engineering Concentration
Degree earned: B.S. in Biological Engineering

FRESHMAN YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
CH 101 Chemistry - A Molecular Science	3	CH 201 Chemistry - A Quantitative Science	3
CH 102 General Chemistry Lab	1	CH 202 Quantitative Chemistry Lab	1
E 100 Intro. to COE	0	ENG 112 Comp. & Reading	3
E 115 Intro. to Computing Environ	1	MA 241 Calculus II	4
ENG 111 Comp. & Rhetoric	3	PY 205 Physics for Engr. & Sc I	4
MA 141 Calculus I	4	Physical Education Elective	1
Humanities/Soc.Sci Elective[1]	3		16
Any 100-level PE in Fitness & Wellness	1		
	16		

SOPHOMORE YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
BAE 101 Intro. to BAE & Comp.	3	BAE 202 Intro. to BAE Methods	3
MAE 206 Engr. Statics [2]or		BAE(BIO) 235 Engr. Biology	3
CE 214 Engr. Mechanics-Statics	3	MAE 208 Engr. Dynamics[2] or	
MA 242 Calculus III	4	CE 215 Engr. Mechanics - Dynamics	3
PY 208 Physics for Engr. & Sci. II	4	MA 341 Applied Diff. Equations	3
Humanities/Soc.Sci. Elective[1]	3	MAE 301 Engr. Thermodynamics I	3
	17		15

JUNIOR YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
BAE 402 Transport Phenomena	3	BAE 315 Properties of Bio. Engr. Materials	3
BAE Elective[3]	3	BAE 361 Analytic Meth. Engr. Design	3
MAE 308 Fluid Mechanics[2] or		ECE 331 Princ. Electr. Engr. I	3
CE 382 Hydraulics	3	MAE 314 Solid Mechanics[2] or	
SSC 200 Soil Science	4	CE 313 Mechanics of Solids	3
ST 361 or ST 370 Statistics	3	CH 220 Organic Chemistry	4
	16		16

SENIOR YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
BAE 401 Bioinstrumentation	3	BAE 452 Engr. Design II	3
BAE 451 Engr. Design I	2	Biol. Science Elective[5]	3
Engr. Sci. Elective[6]	3	Biol. or Engr. Science Elective[5,6]	3
Ethics Elective[7]	3	Humanitites/Soc.Sci. Elective[1]	3
Humanities/Soc.Sci. Elective[1]	3	Humanities/Soc.Sci Elective[1]	3
Communication Elective[8]	3	Humanities/Soc.Sci Elective[1]	3
	17		18

Total Hours Required for Graduation: 131

[1]Eighteen (18) hours Humanities/Social Sciences from the College of Engineering approved courses (Requires EC 201,EC 205, or ARE 201) and guidelines for choosing courses plus three(3) hours for the Science, Technology and Society category.[7]
[2]Students should follow either the CE214-CE215-CE382-CE313 or MAE206-MAE208-MAE308-MAE314 sequence.
[3]Choose from: BAE 422, BAE 465, BAE 471, BAE 481.
[5]Choose from: ANS 150 or ZO 150, ANS 205, ANS 201, ANS 230, ANS 324, ANS 402, ANS 403, ANS 404, BO 200, BO 360, BO 421, CS 200, CS 213, CS 318, CS 411, FOR 252, HS 301, HS 421, HS 422, HS 431, HS 440, HS(FS) 462, PO 201, PO 322, PO 405, PO 420, PO 423, PO 425, SSC 370, SSC 461, ZO 260.
[6]Choose from: BAE 462, BAE 472, BAE 473, BAE 578, IE 311 (if two Engr.Science Electives are taken), MAE 435 (if two Engr.Science Electives are taken).
[7]Choose from: MDS 201, MDS 320, MDS 325, PHI 311, PHI 322. Satisfies Science, Technology and Society category of the General Education Requirements.
[8]Choose from: COM 110, ENG 331, ENG 333.

CURRICULUM IN BIOLOGICAL ENGINEERING, Biomedical Engineering Concentration
Degree earned: B.S. in Biological Engineering

FRESHMAN YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
CH 101 Chemistry - A Molecular Science	3	CH 201 Chemistry - A Quantitative Science	3
CH 102 General Chemistry Lab	1	CH 202 Quantitative Chemistry Lab	1
E 100 Intro. to COE	0	ENG 112 Comp. & Reading	3
E 115 Intro. to Computing Environ	1	MA 241 Calculus II	4
ENG 111 Comp. & Rhetoric	3	PY 205 Physics for Engr. & Sc I	4
MA 141 Calculus I	4	Physical Education Elective	1
Humanities/Soc.Sci Elective[1]	3		16
Any 100-level PE in Fitness & Wellness	1		
	16		

SOPHOMORE YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
BAE 101 Intro. to BAE & Comp.	3	BAE 202 Intro. to BAE Methods	3
MAE 206 Engr. Statics[2] or		BAE(BIO) 235 Engr. Biology	3
CE 214 Engr. Mechanics-Statics	3	MAE 208 Engr. Dynamics[2] or	
MA 242 Calculus III	4	CE 215 Engr. Mechanics - Dynamics	3
PY 208 Physics for Engr. & Sci. II	4	MA 341 Applied Diff. Equations	3
Humanities/Soc.Sci. Elective[1]	3	MAE 301 Engr. Thermodynamics I	3
	17		**15**

JUNIOR YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
BAE 402 Transport Phenomena	3	BAE 315 Properties of Bio. Engr. Materials	3
BAE 465 Biomed. Engr. Applications	3	BAE Elective[3]	3
MAE 308 Fluid Mechanics[2] or		ECE 331 Princ. Electr. Engr. 1	3
CE 382 Hydraulics	3	MAE 314 Solid Mechanics[2] or	
CH 220 Organic Chemistry[4]	4	CE 313 Mechanics of Solids	3
ST 361 or ST 370 Statistics	3	Biol. Science Elective[5]	4
	16		**16**

SENIOR YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
BAE 401 Bioinstrumentation	3	BAE 452 Engr. Design II	3
BAE 451 Engr. Design I	2	Biol. Science Elective[5]	3
Engr. Sci. Elective[6]	3	Biol. or Engr. Science Elective[5,6]	3
Ethics Elective[7]	3	Humanitites/Soc.Sci. Elective[1]	3
Humanities/Soc.Sci. Elective[1]	3	Humanities/Soc.Sci Elective[1]	3
Communication Elective[8]	3	Humanities/Soc.Sci Elective[1]	3
	17		**18**

Total Hours Required for Graduation: 131

[1]Eighteen (18) hours Humanities/Social Sciences from the College of Engineering approved courses (Requires EC 201, EC 205, or ARE 201) and guidelines for choosing courses plus three(3) hours for the Science, Technology and Society category.[7]
[2]Students should follow either the CE214-CE215-CE382-CE313 or MAE206-MAE208-MAE308-MAE314 sequence.
[3]Choose from: BAE 361, BAE 422, BAE 471, BAE 481.
[4]Students planning to go to medical school or to take BCH 451 should take CH 221 followed by CH 223.
[5]Choose from: ANS 150 or ZO 150 or ZO 160, BCH 451, BO 277, COM 445, GN 411,MB 351,MB 352, MB 411, MB 412, ZO 212, ZO 250, ZO 410, ZO(BO) 414, ZO 421.
[6]Choose from: BAE 522, IE 311 (if two Engr.Science Elective are taken), IE 543, IE 544, MAE 435 (if two Engr.Science Elective are taken), MAE 510.
[7]Choose from: MDS 201, MDS 320, MDS 325, PHI 311, PHI 322. Satisfies Science, Technology and Society category of the General Education Requirements.
[8]Choose from: COM 110, ENG 331, ENG 333.

CURRICULUM IN BIOLOGICAL ENGINEERING, Bioprocess Engineering Concentration
Degree earned: B.S. in Biological Engineering

FRESHMAN YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
CH 101 Chemistry - A Molecular Science	3	CH 201 Chemistry - A Quantitative Science	3
CH 102 General Chemistry Lab	1	CH 202 Quantitative Chemistry Lab	1
E 100 Intro. to COE	0	ENG 112 Comp. & Reading	3
E 115 Intro. to Computing Environ	1	MA 241 Calculus II	4
ENG 111 Comp. & Rhetoric	3	PY 205 Physics for Engr. & Sc I	4
MA 141 Calculus I	4	Physical Education Elective	1
Humanities/Soc.Sci Elective[1]	3		**16**
Any 100-level PE in Fitness & Wellness	1		
	16		

SOPHOMORE YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
BAE 101 Intro. to BAE & Comp.	3	BAE 202 Intro. to BAE Methods	3
MAE 206 Engr. Statics[2] or		BAE(BIO) 235 Engr. Biology	3
CE 214 Engr. Mechanics-Statics	3	MAE 208 Engr. Dynamics[2] or	
MA 242 Calculus III	4	CE 215 Engr. Mechanics - Dynamics	3
PY 208 Physics for Engr. & Sci. II	4	MA 341 Applied Diff. Equations	3
Humanities/Soc.Sci. Elective[1]	3	MAE 301 Engr. Thermodynamics I	3
	17		**15**

JUNIOR YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
BAE 402 Transport Phenomena	3	BAE 315 Properties of Bio. Engr. Materials	3
BAE Elective[2]	3	BAE 422 Intro. Food Process Engr.	3
MAE 308 Fluid Mechanics[2] or		ECE 331 Princ. Electr. Engr. I	3
CE 382 Hydraulics	3	MAE 314 Solid Mechanics[2] or	
CH 220 Organic Chemistry	4	CE 313 Mechanics of Solids	3
ST 361 or ST 370 Statistics	3	MB 351 General Microbiology	3
	16	MB 352 General Microbiology Lab	1
			16

SENIOR YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
BAE 401 Bioinstrumentation	3	BAE 452 Engr. Design II	3
BAE 451 Engr. Design I	2	Ethics Elective[7]	3
FS 402 Food Chemistry	3	Engr. Science Elective[6]	3
FS 421 Food Preservation	3	Humanitites/Soc.Sci. Elective[1]	3
Humanities/Soc.Sci. Elective[1]	3	Humanities/Soc.Sci Elective[1]	3
Communication Elective[8]	3	Humanities/Soc.Sci Elective[1]	3
	17		18

Total Hours Required for Graduation: 131

[1]Eighteen (18) hours Humanities/Social Sciences from the College of Engineering approved courses (Requires EC 201,EC 205 or ARE 201) and guidelines for choosing courses plus three(3) hours for the Science, Technology and Society category.[7]
[2]Students should follow either the CE214-CE215-CE382-CE313 or MAE206-MAE208-MAE308-MAE314 sequence.
[3]Choose from: BAE 361, BAE 465, BAE 471, BAE 481.
[6]Choose from: CHE 425, CHE 467, CHE 551, FS (BAE) 585.
[7]Choose from: MDS 201, MDS 320, MDS 325, PHI 311, PHI 322. Satisfies Science, Technology and Society category of the General Education Requirements.
[8]Choose from: COM 110, ENG 331, ENG 333.

CURRICULUM IN BIOLOGICAL ENGINEERING, Environmental Engineering Concentration
Degree earned: B.S. in Biological Engineering

FRESHMAN YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
CH 101 Chemistry - A Molecular Science	3	CH 201 Chemistry - A Quantitative Science	3
CH 102 General Chemistry Lab	1	CH 202 Quantitative Chemistry Lab	1
E 100 Intro. to COE	0	ENG 112 Comp. & Reading	3
E 115 Intro. to Computing Environ	1	MA 241Calculus II	4
ENG 111 Comp. & Rhetoric	3	PY 205 Physics for Engr. & Sc I	4
MA 141 Calculus I	4	Physical Education Elective	1
Humanities/Soc.Sci Elective[1]	3		16
Any 100-level PE in Fitness & Wellness	1		
	16		

SOPHOMORE YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
BAE 101 Intro. to BAE & Comp.	3	BAE 202 Intro. to BAE Methods	3
MAE 206 Engr. Statics[2] or		BAE(BIO) 235 Engr. Biology	3
CE 214 Engr. Mechanics-Statics	3	MAE 208 Engr. Dynamics[2] or	
MA 242 Calculus III	4	CE 215 Engr. Mechanics - Dynamics	3
PY 208 Physics for Engr. & Sci. II	4	MA 341 Applied Diff. Equations	3
Humanities/Soc.Sci. Elective[1]	3	MAE 301 Engr. Thermodynamics I	3
	17		15

JUNIOR YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
BAE 402 Transport Phenomena	3	BAE 315 Properties of Bio. Engr. Materials	3
BAE 471 Land Resource Envir.Engr.	3	BAE 472/572 Irrigation & Drainage	3
MAE 308 Fluid Mechanics[2] or		ECE 331 Princ. Electr. Engr. I	3
CE 382 Hydraulics	3	MAE 314 Solid Mechanics[2] or	
CH 220 Organic Chemistry	4	CE 313 Mechanics of Solids	3
SSC 200 Soil Science	4	ST 361 or ST 370 Statistics	3
	17		15

SENIOR YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
BAE 401 Bioinstrumentation	3	BAE 452 Engr. Design II	3
BAE 451 Engr. Design I	2	Biol. Science Elective[5]	3
Engr. Sci. Elective[6]	3	BAE Elective[3]	3
Ethics Elective[7]	3	Humanitites/Soc.Sci. Elective[1]	3
Humanities/Soc.Sci. Elective[1]	3	Humanities/Soc.Sci Elective[1]	3
Communication Elective[8]	3	Humanities/Soc.Sci Elective[1]	3
	17		**18**

Total Hours Required for Graduation: 131

[1]Eighteen (18) hours Humanities/Social Sciences from the College of Engineering approved courses (Requires EC 20, EC 205 or ARE 201) and guidelines for choosing courses plus three(3) hours for the Science, Technology and Society category.[7]
[2]Students should follow either the CE214-CE215-CE382-CE313 or MAE206-MAE208-MAE308-MAE314 sequence.
[3]Choose from: BAE 361, BAE 422, BAE 465, BAE 481.
[5]Choose from: BO 360, BO 421, MB 351, MB 352, SSC 461, ZO 419.
[6]Choose from: BAE 473/573, BAE 578.
[7]Choose from: MDS 201, MDS 320, MDS 325, PHI 311, PHI 322. Satisfies Science, Technology and Society category of the General Education Requirements.
[8]Choose from: COM 110, ENG 331, ENG 333.

DEPARTMENT OF CHEMICAL ENGINEERING

www.che.ncsu.edu/

Riddick Engineering Laboratories, Room 113
Phone: (919) 515-2324

R. G. Carbonell, *Head*
B. D. Freeman, *Associate Head*
P. K. Kilpatrick, *Associate Head*
S. A. Khan, *Director of Graduate Programs*
H. Winston, *Coordinator of Advising*

Distinguished University Professor: D.F. Ollis; *Aloca Professors:* C.K. Hall, R.M. Kelly; *Camille Dreyfus Professor:* H.B. Hopfenberg; *H. Clark Professor:* K.E. Gubbins; *Hoechst-Celanese Professors:* R.G. Carbonell, R.M. Fielder; *Professors:* K.J. Bachman, R.G. Carbonell, J.E. DeSimone, P.S. Fedkiw, R.M. Felder, B.D. Freeman, K.E. Gubbins, C.K. Hall, H.B. Hopfenberg, R.M. Kelly, P.K. Kilpatrick, P.K. Lim, D.C. Martin, D.F. Ollis, M.R. Overcash, G.W. Roberts, C.J. Setzer; *Adjunct Professors:* D.J. Hammond, D.J. Kiserow, I. Pinnau, C Quah, M.E. Stewart, A.H. Wehe, R.F. Weimer, J.L. Williams;*Professors Emeriti:* K.O. Beatty, J.K. Ferrell, D.B. Marsland, A.S. Michaels, V.T. Stannett; *Associate Professors:* C.M. Balik, C.S. Grant, S.A. Khan, H.H. Lamb, G.N. Parsons, S.W. Peretti, R.J. Spontak, H. Winston; *Adjunct Associate Professors:* P. Schlosser, J.J. Spivey; *Assistant Professor:* J. Genzer; *Adjunct Assistant Professor:* R.T. Chern, J. Jun.

The sound management of material, environmental, and energy resources, taking into account natural economic constraints, guides the performance of chemical engineering practice. Chemical engineering education integrates design and analysis, science and technology, with communication skills developed through exposure to the humanities and the social and economic sciences. Chemical engineering organizes these diverse skills into a coherent discipline uniquely suited to the needs of the chemical, biochemical, environmental, petroleum, plastics, textile, and pulp and paper industries.

FACILITIES

Departmental teaching and research activities are based on the four floors comprising the east wing of the Riddick Engineering Laboratories. Equipment for studying the principles of fluid flow, heat transfer, distillation, absorption, and drying is maintained in several laboratories. Chemical reaction kinetics including heterogeneous catalysis and polymerization are studied on specially designed equipment. Extensive apparatus is available for characterizing the relationships between molecular structure and bulk properties of polymers. A 2,000 square foot biotechnology laboratory has been equipped to include a pilot plant for studying biologically- mediated chemical reactions. Specialized digital computational equipment complements campus-wide university computer resources. The department makes constant use of the College of Engineering EOS computer system which is accessible for use 24 hours a day by students and faculty.

OPPORTUNITIES

Graduates find employment at attractive salaries in diverse sub-disciplines including research and development, production, management and administration; process control, technical service, and sales; estimation and specification writing; consulting and teaching. Students desiring careers in teaching, research, or consulting are advised to consider graduate training (consult the *Graduate Catalog*). Chemical engineering graduates often pursue careers in law or the medical sciences since the broadly structured undergraduate curriculum provides strong preparation for graduate study in a wide range of professional specialties.

MINOR IN CHEMICAL ENGINEERING

In addition to B.S. graduates of the chemical engineering program at NC State, there is a pool of students in other disciplines whose professional work assignments may require a knowledge of chemical engineering nomenclature, technologies and methods. The minor in chemical engineering is intended to allow such students to develop an understanding of the fundamental concepts and practice of chemical engineering. This minor should be most attractive to undergraduate students in environmental engineering, pulp and paper technology, and chemistry, and it will allow non-chemical engineering majors to prepare themselves for graduate study in chemical engineering with a minimum amount of prerequisite work following their acceptance into the graduate program.

Students enrolled in the minor in chemical engineering must complete CHE 205, CHE 225, CHE 311, CHE 315, CHE 316, and CHE 446. All the courses must be completed with a grade of C - or higher.

An application for the minor must be submitted to the Coordinator of Advising in the Department of Chemical Engineering. Admission to the minor will require a minimum 2.5 over-all grade point average at NC State, and a grade of B- or higher on the first enrollment in CHE 205.

CURRICULA

The successful practice of chemical engineering requires a broad, diversified preparation. The spirit of research and experimental inquiry is vital; students, therefore, require sound scientific backgrounds essential to original and disciplined thought, enthusiastic inquiry and, ultimately, original and constructive accomplishment. The undergraduate curriculum emphasizes the scientific, engineering, and economic principles involved in the design and operation of chemical processes.

Design methodologies are practiced in all core chemical engineering courses. This integrated design experience culminates with the senior design sequence, CHE 450 and CHE 451. The background in organic, physical, and inorganic chemistry is comparable to the training offered to chemistry majors. Mathematics, physical sciences, and distributed humanities courses are also required. The chemical engineering program, which is accredited by the Engineering Accreditation Commission of the Accreditation Board for Engineering and Technology (ABET), leads to the degree Bachelor of Science in Chemical Engineering.

CURRICULUM IN CHEMICAL ENGINEERING

Degree earned: B.S. in Chemical Engineering

FRESHMAN YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
CH 101 Chemistry - A Molecular Science	3	CH 201 Chemistry - A Quantitative Science	3
CH 102 General Chemistry Lab	1	CH 202 Quantitative Chemistry Lab	1
E 100 Intro. to COE	0	ENG 112 Comp. & Reading	3
E 115 Intro. to Computing Environ	1	MA 241 Analytic Geom. & Calculus II	4
ENG 111 Comp. & Rhetoric	3	PY 205 Physics for Engr. & Sc I	4
MA 141 Analytic Geom. & Calculus I	4	Physical Education	1
Humanities/Soc.Sci Elective	3		**16**
Any 100-level PE in Fitness & Wellness	1		
	16		

SOPHOMORE YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
CH 221 Organic Chemistry I	4	CH 223 Organic Chemistry II	4
CHE 205 Chemical Proc. Principle	4	CHE 225 Chemical Proc. Systems	3
MA 242 Analytic Geom. & Calculus III	4	MA 341 Applied Diff. Equations	3
Humanities/Soc.Sci. Elective	3	PY 208 Physics Engr. & Sci. II	4
		Humanities/Soc.Sci. Elective	3
	15		**17**

JUNIOR YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
CH 315 Quantitative Analysis	4	Chemistry Elective	4
CHE 311 Transport Processes I	3	CHE 312 Transport Processes II	3
CHE 315 Chem Process Thermo	3	CHE 316 Thermo of Chem & Phase Equations	3
ECE 331 Principle Electrical Engr or		CHE 330 CHE Lab I	3
MAT 201 Struct. Prop. Engr. Materials	3	Humanities/Soc.Sci. Elective	3
ENG 331 Comm. for Engr. & Tech.	3		**16**
	16		

SENIOR YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
CHE 331 CHE Lab II	2	CHE 425 Proc System Analy & Control	3
CHE 446 Des. & Analy. Chem. Reactors	3	CHE 451 CHE Design II	3
CHE 450 CHE Design I	3	Humanites/Soc.Sci. Elective	3
Humanities/Social Science Elective	3	Humanities/Soc.Sci. Elective	3
Technical Elective	3	Technical Elective	3
	14		**15**

Total Hours Required for Graduation: 125

*Note: All students graduating from this curriculum must demonstrate competency in a foreign language at the 102 level (second semester.)

BIOSCIENCES CONCENTRATION IN CHEMICAL ENGINEERING

By enhanced exposure to the biological sciences, the biosciences option in chemical engineering enables the student to develop insight into biological systems and processes.

CURRICULUM IN CHEMICAL ENGINEERING,BIOSCIENCES OPTION
Degree earned: B.S. in Chemical Engineering

FRESHMAN YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
CH 101 Chemistry - A Molecular Science	3	CH 201 Chemistry - A Quantitative Science	3
CH 102 General Chemistry Lab	1	CH 202 Quantitative Chemistry Lab	1
E 100 Intro. to COE	0	ENG 112 Comp. & Reading	3
E 115 Intro. to Computing Environ	1	MA 241 Analytic Geom. & Calculus II	4
ENG 111 Comp. & Rhetoric	3	PY 205 Physics for Engr. & Sc I	4
MA 141 Analytic Geom. & Calculus I	4	Physical Education	1
Humanities/Soc.Sci Elective	3		**16**
Any 100-level PE in Fitness & Wellness	1		
	16		

SOPHOMORE YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
BIO 125 General Biology	4	CH 223 Organic Chemistry II	4
CH 221 Organic Chemistry I	4	CHE 225 Chemical Proc. Systems	3
CHE 205 Chemical Proc. Principle	4	MA 341 Applied Diff. Equations	3
MA 242 Analytic Geom. & Calculus III	4	PY 208 Physics Engr. & Sci. II	4
		Humanities/Soc.Sci. Elective	3
	16		**17**

JUNIOR YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
BCH 451 Intro. Biochemistry	4	Bioscience Elective	3
BCH 452 Biochemistry Lab	2	CHE 312 Transport Processes II	3
CHE 311 Transport Proc. I	3	CHE 316 Thermo of Chem & Phase Equations	3
CHE 315 Chemical Proc. Thermo.	3	CHE 330 CHE Lab I	3
ECE 331 Principle Electrical Engr. or		Humanities/Soc.Sci. Elective	3
MAT 201 Struct. & Props. Engr. Materials	3		**15**
ENG 331 Comm. for Engr. & Tech.	3		
	18		

SENIOR YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
CHE 331 CHE Lab II	2	CHE 425 Proc System Analy & Control	3
CHE 446 Des. & Analy. Chem. Reactors	3	CHE 451 CHE Design II	3
CHE 450 CHE Design I	3	CHE 551 Biochemical Engr.	3
Humanities/Soc.Sci. Elective	3	Humanities/Soc.Sci. Elective	3
Humanities/Soc.Sci. Elective	3	Humanities/Soc.Sci. Elective	3
	14		**15**

Total Hours Required for Graduations: 127

*Note: All students who graduate from this curriculum must demonstrate competency in a foreign language at the 102 level (second semester).

ELECRONIC MATERIALS CONCENTRATION IN CHEMICAL ENGINEERING
The electronic materials option in chemical engineering allows the student to develop an understanding of the scientific and technological principles associated with design and manufacture of computer chips and other microelectronics devices.

CURRICULUM IN CHEMICAL ENGINEERING, Electronic Materials Concentration
Degree earned: B.S. in Chemical Engineering

FRESHMAN YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
CH 101 Chemistry - A Molecular Science	3	CH 201 Chemistry - A Quantitative Science	3
CH 102 General Chemistry Lab	1	CH 202 Quantitative Chemistry Lab	1
E 100 Intro. to COE	0	ENG 112 Comp. & Reading	3
E 115 Intro. to Computing Environ	1	MA 241 Analytic Geom. & Calculus II	4
ENG 111 Comp. & Rhetoric	3	PY 205 Physics for Engr. & Sc I	4
MA 141 Analytic Geom. & Calculus I	4	Physical Education	1
Humanities/Soc.Sci Elective	3		**16**
Any 100-level PE in Fitness & Wellness	1		
	16		

SOPHOMORE YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
CH 221 Organic Chemistry I	4	CH 223 Organic Chemistry II	4
CHE 205 Chemical Proc. Principle	4	CHE 225 Chemical Proc. Systems	3
MA 242 Analytic Geom. & Calculus III	4	MA 341 Applied Diff. Equations	3
PY 208 Physics Engr. & Sci. II	4	MAT 201 Struct. & Props. Engr. Materials	3
	16	Humanities/Soc.Sci. Elective	3
			16

JUNIOR YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
CH 315 Quantitative Analysis	4	CH 437 Physical Chem. for Engrs.	4
CHE 311 Transport Proc. I	3	CHE 312 Transport Processes II	3
CHE 315 Chemical Proc. Thermo.	3	CHE 316 Thermo of Chem & Phase Equations	3
ENG 331 Comm. for Engr. & Tech.	3	CHE 330 CHE Lab I	3
Humanities/Soc.Sci. Elective	3	MAT 331 Electronic Prop. of Materials	3
	16	MAT 333 Electronic Prop. Lab	1
			17

SENIOR YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
CHE 331 Chemical Engr. Lab II	2	CHE 425 Proc System Analy & Control	3
CHE 446 Des. & Analy. Chem. Reactors	3	CHE 451 CHE Design II	3
CHE 450 CHE Design I	3	CHE 460 Chem. Process of Elec. Materials	3
Electronic Materials Elective	3	Humanities/Soc.Sci. Elective	3
Humanities/Soc.Sci. Elective	3	Humanities/Soc.Sci. Elective	3
Humanities/Soc.Sci. Elective	3		15
	17		

Total Hours Required for Graduation: 129

*Note: All students who graduate from this curriculum must demonstrate competency in a foreign language at the 102 level.

CURRICULUM IN CHEMICAL ENGINEERING, Pollution Prevention Concentration
Degree earned: B.S. in Chemical Engineering

* Students who complete this concentration will gain knowledge for the analysis and design of environmentally conscious manufacturing processes and operations.

FRESHMAN YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
CH 101 Chemistry - A Molecular Science	3	CH 201 Chemistry - A Quantitative Science	3
CH 102 General Chemistry Lab	1	CH 202 Quantitative Chemistry Lab	1
E 100 Intro. to COE	0	ENG 112 Comp. & Reading	3
E 115 Intro. to Computing Environ.	1	MA 241 Calculus II	4
ENG 111 Comp. & Rhetoric	3	PY 205 Physics for Engr. & Sc I	4
MA 141 Calculus I	4	Physical Education	1
Humanities/Soc.Sci Elective	3		16
Any 100-level PE in Fitness & Wellness	1		
	16		

SOPHOMORE YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
CH 221 Organic Chemistry I	4	CH 223 Organic Chemistry II	4
CHE 205 Chemical Proc. Prin.	4	CHE 225 Chemical Proc. Systems	3
MA 242 Calculus III	4	MA 341 Applied Diff. Equations	3
Humanities/Soc.Sci. Elective	3	PY 208 Physics Engr. & Sci. II	4
	15	Humanities/Soc.Sci. Elective	3
			17

JUNIOR YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
CH 315 Quantitative Analysis	4	Pollution Prevention Elective	3
CHE 311 Transport Processes I	3	CHE 312 Transport Processes II	3
CHE 315 Chem Process Thermo.	3	CHE 316 Thermo Chem & Phase Equations	3
CHE 485 Mgmt. of Hazardous Wastes	1	CHE 330 CHE Lab I	3
ECE Prin. of Electrical Engr. or		Humanities/Soc.Sci. Elective	3
MAT 201 Struct. & Prop. Engr. Material	3		15
ENG 331 Comm for Engr. & Tech	3		
	17		

SENIOR YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
Chemistry Elective	4	CHE 425 Proc System Analysis & Control	3
CHE 331 CHE Lab II	2	CHE 451 CHE Design II	3
CHE 446 Des. & Analysis Chem. Reactors	3	CHE 475 Advances in Pollution Prevention	3
CHE 450 CHE Design I	3	Humanities/Soc.Sci. Elective	3
Humanities/Soc.Sci. Elective	3	Humanities/Soc.Sci. Elective	3
	15		**15**

Total Hours Required for Graduation: 126*

* Note: All students graduating from this curriculum must demonstrate competency in a foreign language at the 102 level (second semester.)

CHE Pollution Prevention Electives (3 hours required) must be selected from the following list:
CE 280 Principles of Environmental Engineering
CE 456 Air Quality
CE 476 Air Pollution Control
CE 477 Solid Waste Management
CE 484 Water Supply and Waste Water Systems
T 401 Environmental Aspects of Textiles Industrie

CURRICULUM IN CHEMICAL ENGINEERING, Polymer Science Concentration
Degree earned: B.S. in Chemical Engineering

* Students who complete the polymer sciences concentration in chemical engineering will gain an understanding of the fundamental principles and technology associated with the design, analysis, and processing of plastics, colloids, composites and complex polymeric systems.

FRESHMAN YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
CH 101 Chemistry - A Molecular Science	3	CH 201 Chemistry - A Quantitative Science	3
CH 102 General Chemistry Lab	1	CH 202 Quantitative Chemistry Lab	1
E 100 Intro. to COE	0	ENG 112 Comp. & Reading	3
E 115 Intro. to Computing Environ.	1	MA 241 Analytic Geom. & Calculus II	4
ENG 111 Comp. & Rhetoric	3	PY 205 Physics for Engr. & Sc I	4
MA 141 Analytic Geom. & Calculus I	4	Physical Education	1
Humanities/Soc.Sci Elective	3		**16**
Any 100-level PE in Fitness & Wellness	1		
	16		

SOPHOMORE YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
CH 221 Organic Chemistry I	4	CH 223 Organic Chemistry II	4
CHE 205 Chemical Proc. Prin.	4	CHE 225 Chemical Proc. Systems	3
MA 242 Analytic Geom. & Calculus III	4	MA 341 Applied Diff. Equations	3
Humanities/Soc.Sci. Elective	3	PY 208 Physics Engr. & Sci. II	4
	15	Humanities/Soc.Sci. Elective	3
			17

JUNIOR YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
CHE 311 Transport Processes I	3	CH 315 Quantitative Analysis	4
CHE 315 Chem Process Thermo.	3	CHE 312 Transport Processes II	3
MAT 201 Struct. Prop. Engr. Materials	3	CHE 316 Thermo Chem & Phase Equations	3
TC 461 Intro. Fiber Form. Polymers	4	CHE 330 CHE Lab I	3
ENG 331 Comm. for Engr. & Tech	3	Humanities/Soc.Sci. Elective	3
	16		**16**

SENIOR YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
CHE 331 CHE Lab II	2	CHE 425 Proc System Analy & Control	3
CHE 446 Des. & Analy. Chem. Reactors	3	CHE 451 CHE Design II	3
CHE 450 CHE Design I	3	Polymer Sciences. Elective	3
CHE 461 Polymer Sci. & Tech. or		Humanities/Soc.Sci. Elective	3
MAT 425 Intro. to Polymeric Materials	3	Humanities/Soc.Sci. Elective	3
Humanities/Soc.Sci. Elective	3		
	14		**15**

Total Hours Required for Graduation: 125*

* Note: All students graduating from this curriculum must demonstrate competency in a foreign language at the 102 level (second semester.)

CHE Polymer Sciences Electives (3 credits required) must be selected from the following list:
CHE 465 Diffusion in Polymers
CHE 467 Polymer Rheology
CHE 469 Polymers, Surfactants and Colloidal Materials
MAT 475 Polymer Technology and Engineering

HONORS PROGRAM
The Honors Program allows talented students to gain a deeper understanding of chemical engineering principles than would be acquired by completing the "standard" CHE curriculum. Admission to the program requires students to have earned a minimum overall grade point average of 3.500, and a minimum grade point average of 3.250 in CHE 205 and CHE 225.

CURRICULUM IN CHEMICAL ENGINEERING, Honors Program
Degree earned: B.S. in Chemical Engineering

FRESHMAN YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
CH 101 Chemistry - A Molecular Science	3	CH 201 Chemistry - A Quantitative Science	3
CH 102 General Chemistry Lab	1	CH 202 Quantitative Chemistry Lab	1
E 100 Intro. to COE	0	ENG 112 Comp. & Reading	3
E 115 Intro. to Computing Environ	1	MA 241 Calculus II	4
ENG 111 Comp. & Rhetoric	3	PY 205 Physics for Engr. & Sc I	4
MA 141 Calculus I	4	Physical Education	1
Humanities/Soc.Sci Elective	3		**16**
Any 100-level PE in Fitness & Wellness	1		
	16		

SOPHOMORE YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
CH 221 Organic Chemistry I	4	CH 223 Organic Chemistry II	4
CHE 205 Chemical Proc. Principle	4	CHE 225 Chemical Proc. Systems	3
MA 242 Calculus III	4	MA 341 Applied Diff. Equations	3
Humanities/Soc.Sci. Elective	3	PY 208 Physics Engr. & Sci. II	4
	15	Humanities/Soc.Sci. Elective	3
			17

JUNIOR YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
CH 315 Quantitative Analysis	4	Chemistry Elective	4
CHE 311H Transport Processes I	3	CHE 312H Transport Processes II	3
CHE 315 Chem Process Thermo	3	CHE 316 Thermo of Chem & Phase Equations	3
ECE 331 Principle Electrical Engr or		CHE 330 CHE Lab I	3
MAT 201 Struct. Prop. Engr. Materials	3	Mathematics Elective[1]	3
ENG 331 Comm. for Engr. & Tech.	3		**16**
	16		

SENIOR YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
CHE 497 Chem. Engr. Projects	3	CHE 425 Proc System Analysis & Control	3
CHE 446 Des. & Analy. Chem. Reactors	3	CHE 451 CHE Design II	3
CHE 450 CHE Design I	3	Humanites/Soc.Sci. Elective	3
Honors Program Elective[2]	3	Humanities/Soc.Sci. Elective	3
Humanities/Soc.Sci. Elective	3	Technical Elective	3
Humanities/Soc.Sci. Elective	3		**15**
	18		

Total Hours Required for Graduation: 129

Notes:
[1]The mathematics course will be selected from MA 401, MA 402, MA 405, MA 427, or MA 501.
[2]Honors Program Elective. Choose one from: CHE 511, CHE 513, or CHE 515
*All students graduating from this curriculum must demonstrate competency in a foreign language at the 102 level (second semester.)

DUAL DEGREE: B.S. Chemical Engineering / M.S. Management

CURRICULUM FOR DUAL DEGREE: BS CHEMICAL ENGINEERING/MS MANAGEMENT
Degrees earned: B.S. Electrical Engineering and M.S. Management

FRESHMAN YEAR

Fall Semster	*Credits*	*Spring Semester*	*Credits*
CH 101 Chemistry - A Molecular Science	3	CH 201 Chemistry - A Quantitative Science	3
CH 102 General Chemistry Lab	1	CH 202 Quantitative Chemistry Lab	1
E 100 Intro. to COE	0	ENG 112 Comp. & Reading	3
E 115 Intro. to Computing Environ.	1	MA 241 Calculus II	4
ENG 111 Comp. & Rhetoric	3	PY 205 Physics for Engr. & Sci.	4
MA 141 Calculus I	4	Physical Education	1
Humanities/Soc.Sci. Elective	3		
Any 100-level PE in Fitness & Wellness	1		
	16		**16**

SOPHOMORE YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
CH 221 Organic Chemistry	4	CH 223 Organic Chemistry II	4
CHE 205 Chemical Process Prin.	4	CHE 225 Chemical Proc. Systems	3
MA 242 Calculus III	4	MA 341 Applied Diff. Equations	3
Humanities/Soc. Sci. Elective	3	PY 208 Physics for Engr. & Sci. II	4
Physical Education Elective	1	Humanities/Soc. Sci. Elective	3
	16		**17**

JUNIOR YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
CH 315 Quantitative Analysis	4	Chemistry Elective	4
CHE 311 Transport Proc.I	3	CHE 312 Transport Proc. II	3
CHE 315 Chem. Process Thermo.	3	CHE 316 Termo. Chem. & Phase Eq	3
ECE 331 Prin. Electr. Engr. or		CHE 330 CHE Lab I	3
MA 201 Struct. & Prop. Engr. Matl.	3	Humanities/Soc. Sci. Elective	3
ENG 331 Comm. for Engr. & Tech.	3		
	16		**16**

SENIOR YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
ACC 581/582 Accounting	2	BUS 531 Managerial Proc. & Effect	2
CHE 446 Des & Analy.Chem. Reac.	3	ST 361 Intro. Stat. for Engr.	3
CHE 450 CHE Design I	3	CHE 331 CHE Lab II	2
ECG 507 Microecon. & Bus. Environ.	2	CHE 425 Proc. Sys. Analysis & Control	3
Humanities/Soc. Sci. Elective	3	CHE 451 CHE Design II	3
Physical Education	1	CHE 5XX**	3
	16		**16**

FIFTH YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
BUS 502/574 Global and Cultural Environ.	4	BUS 501 Legal and Reg. Envr.	2
BUS 571 Operations Mgmt.	2	BUS 521 Managerial Finance	2
CHE 5XX	3	BUS 532 Human Res. Mgmt.	2
ECG 508 Macro. Econ. & Bus. Envr.	2	BUS 533 Leadership	3
BUS 541 Mgmt. Info. Sys.	2	BUS 581 Long Range Analysis	3
BUS 561 Mkt. Mgmt. & Strategy	2	BUS 583 Mgmt. Practicum	1
	15		**13**

Total Hours Required for both BSCHE & MSM 155*

*Note: Only two of the four credit hours listed for PE count toward credit hours required for graduation.
All students graduating from this curriculum must demonstrate competency in a foreign language at the 102 level.
**CHE 575 Advances in Pollution Prevention recommended.

DEPARTMENT OF CIVIL ENGINEERING

www.ce.ncsu.edu/

Mann Hall, Room 203
Phone: (919) 515-2352

E. Downey Brill, Jr., *Head*
D. W. Johnson, *Associate Head for Graduate Programs*
M. A. Barlaz, *Associate Head*
W. L. Bingham, *Coordinator of Advising*

Civil Engineering Distinguished Professor: J.M. Hanson;*Professors:* E.D. Brill, Jr., R.C. Borden, R.H. Borden, J.S. Fisher, C.G. Gilbert, A.K. Gupta, J.M. Hanson, Y. Horie, D.W. Johnston, N.P. Khosla, H.R. Malcom, W.J. Rasdorf, N.M. Rouphail, C.C. Tung;*Adjunct Professor:* R.H. Reckhow;*Distinguished University Professor Emeritus:* P.Z. Zia; *Professors Emeriti:* M. Amein, P.D. Cribbins, R.A. Douglas, J.F. Ely, R.E. Fadum, C.L. Heimbach, J.W. Horn, A.I. Kashef, C.L. Mann, Jr., P.H. McDonald, H.E. Wahls;*Associate Professors:* M.A. Barlaz, J.W. Baugh, Jr., L.E. Bernold, W.L. Bingham, A.C. Chao, V.C. Gabr, J.E. Hummer, Y.R. Kim, P.C. Lambe, V.C. Matzen *(Alumni Distinguished Undergraduate Professor)*, J.M. Nau *(Alumni Distinguished Undergraduate Professor)*, M.F. Overton, M.S. Rahman, J.R. Stone;*Associate Professors Emeriti:* E.D. Gurley, J.C. Smith; *Assistant Professors:* J.J. Ducoste, H.C. Frey, A. Gupta, T. Hassan, D.R.U. Knappe, M.J. Kowalsky, N. Krstulovic-Opara, M.L. Leming, S.R. Ranjithan, A.A. Tayebali;*Adjunct Assistant Professors:* J.C. Brantley, III, L.R. Goode, D.R. Van der Vaart;*Lecturer:* D.J. Lombardi; *Lecturer and Senior Construction Extension Specialist:* P.P. McCain; *Adjunct Lecturers:* B.A. Doll, B.E. Matthews; *Senior Extension Specialist:* S.M. Rogers, Jr.

The Department of Civil Engineering offers several degree programs concerned with the improvement and care of both public and private infrastructure and natural environments. The discipline addresses the planning, design, construction, operation, and maintenance of buildings, dams, bridges, harbors, power facilities, pollution control facilities, and water supply and transportation systems. The curricula provide academic preparation for students considering a career in civil, construction, or environmental engineering.

The department offers undergraduate degree programs leading to the Bachelor of Science in Civil Engineering, the Bachelor of Science in Construction Engineering and Management, and the Bachelor of Science in Environmental Engineering. All three programs are accredited by the Engineering Accreditation Commission of the Accreditation Board for Engineering and Technology (ABET). Graduation from an ABET accredited engineering degree is the first step toward registration as a Professional Engineer. All three programs also prepare students for graduate education.

OPPORTUNITIES

People will always need constructed facilities to live, work, and sustain their lives and environment, and civil, construction, and environmental engineers will always be needed to plan, design, and construct these facilities. Civil, construction, and environmental engineering comprise such a diversified field that graduates have a wide choice in locations and type of employment. Jobs range from federal, state, or municipal agencies to a variety of manufacturing and processing industries, consulting firms or construction companies. The work may be performed partially or wholly in an office or in the field and may be located in a small community, a large industry center or in a foreign country. Careers in either professional practice or teaching and research are common for many graduates who complete advanced degrees.

FACILITIES

The Department of Civil Engineering has well-equipped laboratories, including a computer laboratory. The computer laboratory contains public workstations and taps into the College of Engineering's Eos network, which provides access to a wide range of engineering software and campus-wide and off-campus computers. The Department's other laboratories contain a variety of special equipment for research in structures, mechanics, soils, construction materials, construction engineering, hydraulics, and environmental engineering.

A new laboratory, the Constructed Facilities Laboratory (CFL) on Centennial Campus, features unique facilities devoted to all aspects of constructed infrastructure research and assessment. Those facilities include: specially designed reaction floors and walls for testing large-scale structural systems to failure such as full scale bridge girders up to 100 feet long and beam-column systems subject to earthquake loading; and large pits up to 20 feet deep for testing granular and compacted soils for foundation strength. State-of-the-art facilities like these heighten students' learning experiences by exposing them to the forefront of technological advances.

CURRICULA

The objective of each of the three curricula is to prepare the graduate for a career in the respective field and for lifelong learning through graduate education, continuing education, and/or self study.

The Civil Engineering curriculum is designed to provide academic discipline in mathematics, the physical sciences, the humanities and social sciences, and the technical aspects of civil engineering. After introductory exposure to several of the professional areas such as environmental and water resources, geotechnical, structures, and transportation engineering, the student builds additional depth in one of these specialties.

The curriculum in Construction Engineering and Management is designed for the students interested in the planning, design, direction, and management of construction projects. It includes the core course requirements in mathematics, the physical sciences, and the humanities and social sciences. After exposure to engineering fundamentals and engineering design of facilities, the curriculum provides a series of specialty courses in construction engineering related to the analysis, design, and management of the construction process. Two concentrations are available: General related types of facilities and Mechanical Construction for those interested in building mechanical or industrial process systems.

The curriculum in Environmental Engineering is designed for students interested in environmental protection. The curriculum provides students with basic knowledge of the chemical, biological and physical processes that govern the transport and fate of pollutants in the environment as well as the design of engineered systems. On graduation, students are prepared to work in the areas of water and wastewater treatment, air pollution control, solid waste management, and hydrology and water resources. The curriculum emphasizes the interdisciplinary nature of environmental engineering with courses in both engineering and life sciences, including specialized courses on pollution control and waste management.

POST-BACCALAUREATE STUDY

If a student is interested in more intense specialization in one particular area, advanced training is available leading to a Professional Degree in civil engineering, the Master of Civil Engineering, the Master of Science or the Doctor of Philosophy. Specialization areas include coastal and ocean engineering, computer-aided engineering, construction engineering and management, construction materials, environmental and water resource engineering, geotechnical engineering, mechanic and structural engineering and transportation engineering. With judicious choices of electives during the B.S. program, a student may also prepare for additional studies in law, business administration, business management or city and regional planning.

STUDENT ACTIVITIES AND SCHOLARSHIPS

Student chapters of the American Society of Civil Engineers, Associated General Contractors, National Association of Home Builders, Institute of Transportation Engineers, and Air and Waste Management Association undertake projects to further student exposure to the profession. Guest speakers representing various aspects of engineering practice speak at weekly lunch meetings. Students who accumulate outstanding academic records may be considered for membership in the Chi Epsilon Honorary Society. Through the generosity of industry and program alumni, many departmental scholarships are available on a competitive basis to students in addition to university, college and need-based financial aid.

CURRICULUM IN CIVIL ENGINEERING
Degree earned: B.S. in Civil Engineering

FRESHMAN YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
CH 101 Chemistry - A Molecular Science	3	CSC 112 Intro. to Comp - FORTRAN or	
CH 102 General Chemistry Lab	1	CSC 114 Intro. to Comp. - C++	3
E 100 Intro. to COE	0	ENG 112 Comp. & Reading	3
E 115 Intro. to Computing Environ	1	MA 241 Calculus II	4
EC 205 Fundamentals of Econ. (H&SS Elect. 1)	3	PY 205 Physics for Engr. & Sci. I	4
ENG 111 Comp. & Rhetoric	3	Physical Education	1
MA 141 Calculus I	4		**15**
Any 100-level PE in Fitness & Wellness	1		
	16		

SOPHOMORE YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
CE 214 Engr. Mechanics - Statics	3	CE 215 Engr. Mechanics - Dynamics	3
GC 120 Foundations of Graphics	3	CE 313 Mechanics of Solids	3
MA 242 Calculus III	4	MA 341 Applied Diff. Equations or	
PY 208 Physics Engr. & Sci. II	4	MA 305 Elem. Linear Algebra	3
Humanities/Soc.Sci. Elective[1] (H&SS Elect. 2)	3	MAT 200 Mech. Prop. of Structural Materials	3
	17	MA 302 Numerical App. to Diff. Equations	1
		Humanities/Soc.Sci. Elective[1] (H&SS Elect. 3	3
			16

JUNIOR YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
CE 375 Civil Engr. Systems	3	CE Technical Elective I[2]	3
CE 382 Hydraulics	3	CE Technical Elective II[2]	3
CE 332 Materials of Construction	3	CE Technical Elective III[2]	3
ST 370 Prob. & Stat.	3	CE 324 Structural Behavior Meas. or	
Humanities/Soc.Sci. Elective[1] (H&SS Elect. 4)	3	CE 381 Hydraulics Lab	1
	15	Basic Science Elective[3]	4
		Humanities/Soc.Sci. Elective[1] (H&SS Elect. 5)	3
			17

SENIOR YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
CE Design Elective I[4]	3	CE Design Elective II[4]	3
CE Technical Elective IV[2]	4	CE Design Elective III[4]	3
Engineering Sci. Elective I[5]	3	Engineering Sci. Elective II[5]	3
COM 110 Public Speaking or		Engineering Sci. Elective III[5]	3
ENG 331 Comm. for Engr. & Tech.	3	Human/Soc. Sci. Elect[1](H&SS Elec. 7)<TD3	
Humanities/Soc.Sci. Elective I(H&SS Elect. 6)	3		**15**
	16		

Total Hours Required for Graduation: 127*

[1]Humanities & Social Science courses to be selected from the appropriate list approved by the College of Engineering.
[2]CE Technical Electives to be selected from the approved list.
[3]Basic Science Elective ..Select one: BIO 125, CH 201 and 202, or MEA 101 and MEA 110.
[4]CE Design Electives to be selected from the approved list.
[5]Engineering Science Electives to be selected from the approved list.
[6]Foreign language proficiency at the FL_102 level will be required for graduation for all students admitted as freshman or transfer students beginning the summer and fall of 1994.

CURRICULUM IN CONSTRUCTION ENGINEERING AND MANAGEMENT
General Construction Concentration
Degree earned: B.S. in Construction Engineering and Management

FRESHMAN YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
CH 101 Chemistry - A Molecular Science	3	CSC 112 Intro. to Computing - FORTRAN or	
CH 102 General Chemistry Lab	1	CSC 114 Intro. to Computing - C++	3
E 100 Intro. to COE	0	ENG 112 Comp. & Reading	3
E 115 Intro. to Computing Environ	1	MA 241 Calculus II	4
EC 201 Economics[1] (H&SS Elective I)	3	PY 205 Physics Engr. & Sci. I	4
ENG 111 Comp. & Rhetoric	3	Physical Education	1
MA 141 Calculus I	4		**15**
Any 100-level PE in Fitness & Wellness[3]	1		
	16		

SOPHOMORE YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
CE 214 Engr. Mechanics - Statics	3	CE 201 Civil Engr. Meas. & Surveys	2
EC 301 Microeconomics[1] (H&SS Elec. 2)	3	CE 215 Engr. Mechanics - Dynamics	3
GC 101 Engr. Graphics I	2	CE 260 Construction Engr. Sys.	1
MA 242 Calculus III	4	CE 313 Mechanics of Solids	3
PY 208 Physics Engr. & Sci. II	4	MAT 200 Mech. Prop. of Structural Materials	3
	16	ST 370 Probability and Statistics for Engrs.	3
			15

JUNIOR YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
CE 325 Structural Analysis	3	CE 327 Reinforced Concrete Design	3
CE 332 Materials of Construction	3	CE 342 Engr. Behavior Soils & Foundations	4
CE 324 Structural Behavior Meas. or		CE 305 Traffic Engr. or	
CE 381 Hydraulics Sys. Meas. Lab	1	CE 367 Mech. & Elec. Sys. in Buildings or	
CE 382 Hydraulics	3	CE 383 Hydrology & Urban Water Sys.	3
CE 463 Constr. Estim. Planning & Control	3	CE 465 Construction Equipment & Methods	3
COM 146 Business & Prof. Communication or		Basic Science Elective[2]	4
ENG 331 Comm. for Engr. & Tech.	3		**17**
	17		

SENIOR YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
CE 426 Structural Steel Design	3	ACC 280 Managerial Accounting or	
CE 464 Legal Aspects of Contracting	3	BUS 330 Human Resource Mgmt.	3
CE 466 Building Construction Engr.	3	CE 469 Construction Engr. Project	3
ECE 331 Principle Electrical Engr. I or		Humanities/Soc.Sci. Elective[1] (H&SS Elec. 6)	3
MAE 301 Engr. Thermodynamics I	3	Humanities/Soc.Sci. Elective[1] (H&SS Elec. 7)	3
Humanities/Soc.Sci. Elective [1](H&SS Elect. 3)	3	Humanities/Soc.Sci. Elective [1](H&SS Elect. 8)	3
Humanities/Soc.Sci. Elective [1](H&SS Elect. 4)	3		**15**
	18		

Total Hours Required for Graduation[3]: 128

[1]Humanities and Social Science courses to be selected from the appropriate list approved by the College of Engineering.
[2]Basic science elective Select one: BIO 125, CH 107 & CH 127, or MEA 101 & MEA 110.

CURRICULUM IN CONSTRUCTION ENGINEERING AND MANAGEMENT
Mechanical Construction Concentration
Degree earned: B.S. in Construction Engineering and Management

FRESHMAN YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
CH 101 Chemistry - A Molecular Science	3	CSC 112 Intro. to Comp - FORTRAN or	
CH 102 General Chemistry Lab	1	CSC 114 Intro. to Comp. - C++	3
E 100 Intro. to COE	0	ENG 112 Comp. & Reading	3
E 115 Intro. to Computing Environ	1	MA 241 Calculus II	4
EC 205 Fundamentals of Economics[1]	3	PY 205 Physics for Engr. & Sci. I	4
ENG 111 Comp. & Rhetoric	3	Physical Education	1
MA 141 Calculus I	4		**15**
Any 100-level PE in Fitness & Wellness	1		
	16		

SOPHOMORE YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
CE 214 Engr. Mechanics- Statics	3	CE 215 Engr. Mechanics - Dynamics	3
EC 301 Microeconomics[1] (H&SS Elec. 2)	3	CE 313 Mechanics of Solids	3
GC 101 Engr. Graphics I	2	MAT 200 Mechanics Prop. of Struct Mat.	3
MA 242 Calculus III	4	ST 370 Probability and Statistics for Engrs.	3
PY 208 Physics for Engr. & Sci. II	4	Humanities/Soc.Sci. Elect.[1] (H&SS Elec.3)	3
	16		**15**

JUNIOR YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
CE 382 Hydraulics	3	CE 367 Mech. & Elec. Sys. in Buildings	3
CE 463 Const. Estim. Planning & Control	3	CE 465 Construction Equipment & Methods	3
COM 146 Business & Prof. Comm. or		MAE 302 Engr. Thermodynamics II	3
ENG 331 Communic. Enginr. & Tech	3	MAE 306 ME Lab II	1
MAE 301 Engr. Thermodynamics I	3	MAE 310 Conduct. & Radiat. Heat Transfer	3
MAE 305 ME Lab I	1	Basic Science Elective[2]	4
MAE 316 Strength of Mech. Components	3		**17**
	16		

SENIOR YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
ACC 280 Managerial Accounting or		CE 469 Construction Engr. Project	3
BUS 330 Human Resource Management	3	MAE 403 Air Conditioning	3
CE 464 Legal Aspects of Contracting	3	MAE 421 Prin. of Solar Engr.	3
ECE 331 Prin. of Electrical Engineering I	3	Humanities/Soc.Sci. Elect.[1] (H&SS Elec. 6)	3
MAE 406 Energy Conservation in Industry	3	Humanities/Soc.Sci. Elect.[1] (H&SS Elec. 7)	3
Humanities/Soc.Sci. Elective[1] (H&SS Elec. 4)	3		**15**
Humanities/Soc.Sci. Elective[1] (H&SS Elec. 5)	3		
	18		

Minimum Credit Hours Required for Graduation[3]: 128

[1]Humanities and Social Science courses to be selected from the appropriate list approved by the College of Engineering.
[2]Basic science elective: Select one: BIO 125, CH 201 & CH 202, or MEA 101 & MEA 110.
[3]Foreign language proficiency at the FL_102 level will be required for graduation for all students admitted as freshmen or transfer students beginning the summer and fall of 1994.

CURRICULUM IN ENVIRONMENTAL ENGINEERING
Degree earned: B.S. in Environmental Engineering

FRESHMAN YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
CH 101 Chemistry - A Molecular Science	3	CH 201 Chemistry - A Quantitative Science	3
CH 102 General Chemistry Lab	1	CH 202 Quantitative Chemistry Lab	1
E 100 Intro. to COE	0	ENG 112 Comp. & Reading	3
E 115 Intro. to Computing Environ	1	MA 241 Calculus II	4
ENG 111 Comp. & Rhetoric	3	PY 205 Physics for Engr. & Sci. I	4
MA 141 Calculus I	4	Physical Education	1
EC 205 Fundamentals of Economics[1]	3		**16**
Any 100-level PE in Fitness & Wellness[2]	1		
	16		

SOPHOMORE YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
CE 214 Engr. Mechanics - Statics	3	BIO 125 General Biology	4
CH 221 Organic Chemistry I or		CE 215 Engr. Mechanics - Dynamics	3
CH 220 Intro. Organic Chemistry	4	CE 280 Prin. of Environmental Engr.	3
CHE 205 Chemical Process Prin.	4	CHE 225 Chemical Process Systems	3
MA 242 Calculus III	4	MA 341 Applied Diff. Equations I	3
Humanities/Soc.Sci. Elective[1]	3		**16**
	18		

JUNIOR YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
CE 374 Environmental Engr. Lab	2	CE 313 Mechanics of Solids	3
CE 382 Hydraulics	3	CE 375 Civil Engr. Systems	3
COM 110 Public Speaking or		CE 381 Hydraulics Systems Meas. Lab	1
ENG 331 Comm. for Engr. & Tech.	3	MAE 301 Engineering Thermodynamics I or	
CSC 112 Intro. to Computing - FORTRAN or		CHE 315 Chemical Process Thermodynamics	3
CSC 114 Intro. to Computing - C++	3	Humanities/Soc.Sci. Elective[1]	3
PY 208 Physics for Enginrs. & Sci. II	4	Humanities/Soc.Sci. Elective[1]	3
	15		**16**

SENIOR YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
CE 383 Hydrology & Urban Water System	3	CE 342 Engr. Behavior of Soils	4
CE 484 Water Supply & Waste Water Systems	3	CE 481 Environmental Engr. Project	3
ST 360 Probability & Stat. for Engr.	3	Environmental Engineering Elective[2]	3
Environmental Engr. Elective[2]	3	Humanities/Soc.Sci. Elective[1]	3
Humanities/Soc.Sci. Elective[1]	3	Humanities/Soc.Sci. Elective[1]	3
	15		**16**

Total Hours Required for Graduation[3]: 128

[1]Humanities & Social Science Courses to be selected from the appropriate list approved by the College of Engineering.
[2]Environmental Engineering Elective to be selected from the appropriate list.
[3]Foreign Language proficiency at the FL_102 level will be required for graduation for all students.

DEPARTMENT OF COMPUTER SCIENCE

www.csc.ncsu.edu/

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A L. Tharp, *Head*
W. G. Scott Jr., *Assistant Head*
R. J. Fornaro, *Director of Undergraduate Programs*
J. Hatch, *Coordinator of Advising*
E. W. Davis, Jr., *Director of Graduate Programs*

Distinguished University Research Professor: D.L. Bitzer; *Alumni Distinguished Undergraduate Professor:* A.L. Tharp; *Emeritus Professors:* D.C. Martin, W.E. Robbins; *Professors:* D.L. Bitzer, W. Chou, E.W. Davis, Jr., R.J. Fornaro, R.E. Funderlic, D.F. McAllister, H.G. Perros, C.D. Savage, W.J. Stewart, K.C. Tai, A.L. Tharp, M.A. Vouk; *Asociate Professors:* D.R. Bahler, R.A. Dwyer, E.F. Gehringer, T.L. Honeycutt, S.P. Iyer, D.S. Reeves, R.D. Rodman, M.F. Stallmann; *Assistant Professors:* A.I. Anton, C.G. Healey, V.E. Jones, J.C. Lester, I. Rhee, J.G. Rossie Jr., G.N. Rouskas, M.P. Singh, R.A. St. Amant, S.F. Wu, R.M. Young; *Visiting Research Professor:* Franc Brglez; *Adjunct Professors:* W.R. Cleaveland II, R.J. Plemmons; *Adjunct Assistant Professors:* M. Aparicio IV, F. Gong, G.Q. Kenney, M. Singh, S.K. Singhal, A.O. Zaghloul; *Lecturers:* J. Hatch, T.E. Nelson, C.S. Miller, J.E. Perry, W.G. Scott Jr., *Adjunct Lecturers:* D.P. Daugherty, M.S. Davis, D.J. Deter, J.R. Holman, J.M. Lake, D.A. Lasher, W.D. Ruchte; *Director of Multimedia Lab:* D.H. Kekas; *Research Assistants:* J.C. Bass, D.S. Garriss, J.W. Riely, J.E. Robinson III, J.P. Streck; *Associate Members of the Department:* J.W. Baugh, Jr. (Civil Engineering), E. Kaltofen (Mathematics), C.D. Meyer, Jr. (Mathematics), J.S. Scoggs (Mathematics), W.E. Snyder (Electrical and Computer Engineering), I. Viniotis (Electrical and Computer Engineering).

Computers and computing are ubiquitous in modern society. The discipline of computer science has evolved during the past three decades with the expanding role of computers. New applications of computers continue to appear. They are used to design, manufacture and operate our automobiles, airplanes and spacecraft; to design our highways, bridges and buildings; to manage banking transactions; to help managers make decisions; to analyze farm production; to help the research scientist; and to monitor manufacturing processes, utilities and communication. Computer science is essential technology for the information superhighway and information services that will lead the economy into the 21st Century.

OPPORTUNITIES

Computer scientists have many career choices because of the diversity of computer use. A graduate may be involved in the design, implementation, or management of computer systems. Some may work more with advancing computer capabilities while others may adapt computers to new applications. Others may pursue advanced study. Some may wish to interact frequently with people, while others may not. For whatever your ambitions and preferences, computer science offers opportunities.

CURRICULA

This undergraduate curriculum leads to the degree of Bachelor of Science in Computer Science. This program is accredited by the Computer Science Accreditation Commission of the Computing Sciences Acreditation Board., a specialized accrediting body recognized by the Council on Postsecondary Accreditation and the U.S. Department of Education. Core courses provide the fundamentals of programming concepts, computer science theory, data structures, computer organization, operating systems, and software engineering. Restricted electives, chosen in consultation with one's advisor during the junior year, allow exploration of specific computer science subareas such as database management systems, operating systems, graphics, multimedia technology, artificial intelligence, networks and World Wide Web (WWW) topics, computer-human interfaces and architecture. Students in another department may select courses in computer science as electives to broaden their programs of study and to learn how to use the computer for solving problems.

CURRICULUM IN COMPUTER SCIENCE
Degree earned: B.S. in Computer Science

FRESHMAN YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
CH 101 Chemistry- A Molecular Science[1]	3	CSC 114 Intro. to Comp. - C++	3
CH 102 General Chemistry Lab	1	ENG 112 Comp. & Reading[1]	3
E 100 Intro. to COE	0	MA 241 Calculus II[1]	4
E 115 Intro. to Computing Environ.	1	PY 205 General Physics I[1]	4
ENG 111 Comp. & Rhetoric[1]	3	Any 100-level PE in Fitness & Wellness	1
MA 141 Calculus I	4		**15**
Humanities/Soc.Sci. Elective[2]	3		
	15		

SOPHOMORE YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
CSC 210 Prog. Lang. Concepts[1]	3	CSC 201 Comp. Org. & Assem. Lang	3
CSC 222 Appl. Discrete Math[1]	3	CSC 311 Data Structures	3
MA 242 Calculus III	4	MA 305 Intro. to Linear Algebra	3
PY 208 General Physics II	4	Humanities/Social Science Elective[2]	3
Physical Education	1	Basic Science Elective[3]	3
	15		**15**

JUNIOR YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
CSC 202 Operating Systems	3	CSC 310 Software Engineering	3
CSC 333 Automata Theory[4] **or**		CSC Restricted Elective[5]	3
CSC 302 Intro. to Numerical Methods	3	EC 305 Fundamentals of Economics **or**	
CSC Restricted Elective[5]	3	EC 201 Prin. of Microecon. **or**	
ENG 331 Comm. for Engr. & Tech.	3	ARE 201 Intro. to Agric. & Resource Econ.	3
Humanities/Soc.Sci. Elective[2]	1	ST 370 Probability & Statistics for Engineers	3
	15	Other Restricted Elective[5]	3
			15

SENIOR YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
CSC Restricted Elective[5]	3	CSC 379 Ethics in Computing	1
CSC 4** Project Course[6]	3	CSC Restricted Elective[5]	3
Humanities/Soc.Sci. Elective[2]	3	CSC Restricted Elective[5]	3
Humanities/Soc.Sci. Elecitve[2]	3	Other Restricted Elective[5]	3
Other Restricted Elective[5]	3	Humanities/Soc.Sci. Elective[2]	3
	15	Free Elective	2
			15
		Total Hours Required for Graduation:	**120**[7]

[1]. D grades are not accepted in CH 101, 121, CSC 114, 210,222, MA 141, 241, ENG 111, 112 and PY 205.
[2] See College of Engineering list of Humanities and Social Sciences requirements.
[3] To be selected from CH 201, PY 228 or any BO, BIO, MEA or ZO.
[4]. Select either CSC 302 or CSC 333 as a core course.
[5]. ACC (210 or 280), plus all 300-level courses except 300; BCH 451; all 300- and 400-level BUS courses except 350; CE 214; CHE 425, 465; CSC 251, 254, 255, 257, 295, 302, 312, (cannot use both ECE 212 and CSC 312 for graduation requirements in CSC), 333, 340, plus all 300- and 500-level courses; all 300-,400- and 500-level EC courses; ECE 211, 212(cannot use both ECE 212 and CSC 312 for graduation requirements in CSC), plus all 300-, 400- and 500 level courses; EMS 480; GC 200, 300, 320, 420; GN 411 plus all 500-level courses; IE 307, 308, 311 or 361 plus all 400-and 500-level courses; MA (301 or 341), 302, 351 plus all 400- and 500-level courses with prerequisites at the 200 level or higher except 421 and 433; all 200-level and higher MAE courses; MAT 201 plus all 300- and 400-level courses; MDS 306; MUS 306; all 300- and 400-level NE courses; all 500-level OR courses; PHI 335 or 425; PSY 307, 340, 400, 410, 420 or 425; all PY 400- and 500-level courses; ST 372 plus all 400- and 500-level courses.
[6]. To be selected from CSC 402, 432, 452, 462, 472, 492.
[7]. The GPA earned in all courses attempted at NCSU must be 2.000 or higher to satisfy university graduation requirement. In addition, the College of Engineering requires either *a GPA or 2.000 or higher in all courses bearing the CSC designation or * a grade of C or higher in each CSC course used to satisfy the requirements in the major.
Note: All students who graduate from this curriculum must demonstrate proficiency in a foreign language at the 102 level.

MINOR IN COMPUTER PROGRAMMING
The Department of Computer Science offers a Minor in Computer Programming to undergraduate majors in any field except computer science and computer engineering. Undergraduates will be admitted to the Minor only if they have an overall GPA of at least 2.25. The Minor consists of the completion with a grade of C or higher of E 115 (S/U grading), CSC 114, 201, 202, 210, 222, 311, and MA 121 (or any college calculus course). At least five of these eight courses must be taken at NC State.

DEPARTMENT OF ELECTRICAL AND COMPUTER ENGINEERING

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R. M. Kolbas, *Head*
J. J. Brickley, Jr., *Associate Head*
R. T. Kuehn, *Director of Graduate Programs*
C. W. Townsend, *Undergraduate Coordinator*

Distinguished University Professor: B.J. Baliga; *Distinguished Professor of Electrical and Computer Engineering:* N.A. Masnari; *University Professor:* J.R. Hauser, *Alumni Distinguished Undergraduate Professor:* M.A. Littlejohn, *Alumni Distinguished Graduate Professsor:* J.B. O'Neal, Jr.,*Professars:* D.P. Agrawa;, W.E. Alexander, B.J. Baliga, S.M. Bedair, P.D. Franzon, T.H. Glisson, J.J. Grainger, J.R. Hauser, J.F. Kauffman, K.W. Kim, R.M. Koulbas, M.A. Littlejohn, W.T. Liu, T.K. Miller, H.T. Nagle, Jr., A.A. Nilsson, J.B. O'Neal, Jr., C.M. Osburn, M.C. Ozturk, S.A. Rajala, W. E. Snyder, M.B. Steer, H. J. Trussell; *Visting Research Professar:* W.C. Holton; *Adjunct Professors:* D. Bradley, R.M. Burger, R.K. Cavin III, Mitra Dutta, R.C. Luo, W. Lynch, M. A. Stroscio, J. Suttle; *Professors Emeriti:* A.J. Goetze, N.F.J. Mattews, L.K. Monteith, A. Reisman, D.R. Rhodes, A. Vanderlugt, J.J. Wortman; *Associate Professors:* S.T. Alexander, G.L. Bilbao, M.Y. Chow, T. Conte, A. Duel-Hallen, E.F. Gehringer, B.L. Hughes, A.W. Kelley, A.M. Mortazawi, D.S. Reeves, J.K. Townsend, I. Viniotis, M.W. White; *Visiting Associate Professor:* J.J. Brickley, T.L. Mitchell; *Adjunct Assaciate Professors:* J.R. Burke, R.J. Evans, R.S. Gyurcsik, S-H Lee, H. Massoud, D. Temple; *Associate Profassors Emeriti:* W.T. Easter, E.G. Manning; *Assistant Professors:* M.E. Baran, G. Byrd, A. Eichenberger, C.S. Gloster, Jr., A.H. Krim, V. Misra; *Visiting Assistant Professors:* B. Allen, R.T. Kuehn, J. Muth, H.O. Ozturk; *Adjunct Assistant Professors:* L.J. Bottomley, W. Chimiak, J.M. Conrad, D. L. Dreifus, J.A. Freebersyser, M.J. Gorman, D.W. Hislop, P.K. McLarty, K.J. Molnar, A. Montalvo, A.S. Morris, III, D. Novosel, R. O. Onvural, S. Rampal, A. J. Rindos III, P. Santago, J.C. Sutton, C.K. Williams; *Visiting Lecturers:* E. Grant, C.W. Townsend; *Adjunct Lecturer:* C. Sastre; *Research Associates:* R. Hamaker, F.G. McIntosh, P. O'Neil, J.C. Roberts, D.G. Yu; *Research Assistants:* E. S. Condon, T. McNulty, G. Saunders, J.M. O'Sullivan, M. Xu; *Assaciate Members of the Department:* D. Bitzer (Computer Science), S. Blanchard (Bio & Agri.),E. Davis (Computer Science), J. Herbert (Multidisciplinary Studies), W. Jasper (Textiles), G. Lucovsky (Physics), D. McAllistar (Computer Science), J. Narayan (Materials Science and Engineering), H. Perros (Computer Science), W. Robbins (Computer Science), J. F. Schetzina (Physics), M. Stallman (Computer Science), K-C Tai (Computer Science), M. Vouk (Computer Science).

The professions of electrical engineering and computer engineering are concerned with the analysis, design, construction and testing of systems based on electrical phenomena. In contemporary technological society, electrical methods are used to communicate and store information, control equipment and systems, perform mathematical operations, and convert energy from one form to another. Frequently, two or more of these functions are important in the design of systems such as television, radio, telecommunications, computers, robots and intelligent machines, telemetry systems, solid-state electronics, biomedical devices, environmental controls, electric machinery, and electric power generation and transmission facilities. Computer engineering is a field in which digital techniques are used in system design. Low-cost solid state microprocessors and memories permit computers to be widely incorporated in many different types of electronic systems. To work effectively in this rapidly growing field, the computer engineer must understand both hardware and software techniques and must effectively use both techniques in order to design, build and test complex digital systems. Both the electrical engineering and the computer engineering programs, which lead respectively to the degrees, Bachelor of Science in Electrical Engineering and Bachelor of Science in Computer Engineering, are accredited by the Engineering Accreditation Commission of the Accreditation Board for Engineering and Technology (ABET).

SCHOLARSHIPS AND AWARDS

Superior academic performance is recognized within this department in three ways: election of students to membership in the electrical engineering honor society, Eta Kappa Nu; awarding of merit scholarships; and presentation of awards to outstanding seniors. The department has one endowed merit scholarship for entering freshmen, the Eugene C. and Winifred Sakshaug Scholarship, and eight endowed scholarships which are usually awarded to juniors and seniors: Elizabeth P. Cockrell, L. A. Mahler, Amelia N. Mitta, Frank T. Pankotay, William DeRosset Scott III, E. Chester Seewald, North Carolina Electric Membership Corporation, and William D. Stevenson, Jr., the latter two of which are for students studying electric power systems. The department also from time to time has scholarships provided by industrial organizations such as the Alcoa Foundation, General Motors Corporation and United Technologies Research Center. Academic merit is generally the primary requirement for these awards, but other characteristics, such as demonstrated leadership, may also be specified. In addition, the endowed William M. Cates Scholarship Program provides multiple scholarships for students having documented financial need and high academic performance. These are awarded each fall to juniors, with provision for continuation in the senior year.

FACILITIES

Many courses are accompanied by coordinated laboratory work and projects. These assignments typically focus on real-world systems and problems and involve computer simulation and analysis, design, development and testing of hardware and software associated with electrical, electronic, and electromechanical systems, circuits and devices. Extensive facilities are provided for experimental study of analog and digital circuits, microprocessors, computers, electrical machinery, VLSI devices, robots and intelligent machines, telecommunications, and microwave systems. The EOS System, a network of state-of-the-art engineering workstations, provides a powerful computing environment available to all students. Two EOS laboratories with more than sixty workstations, mostly color, are located within the department. Electrical and Computer Engineering provides knowledgeable attendants in these laboratories up to eighteen hours a day. A student may log in at over 500 workstations located in these two laboratories and several other facilities throughout the College of Engineering. Powerful software is provided on the system for engineering analysis, design and testing, symbolic mathematics, sophisticated color graphics, scientific spreadsheets, programming languages, word processing, document formatting and other special applications. The department has an Undergraduate Design Center which provides resources for required industry-sponsored, semester-long design projects. Weekly sessions are scheduled in the Undergraduate Teaching Center by teaching assistants to answer student questions about course material. Both centers are equipped with EOS workstations.

CORE COURSES

The electrical and computer engineering curricula share core courses comprising a substantial portion of the first three years of study. Strong emphasis is placed on fundamental concepts in core courses so that graduates are prepared for rapid technological changes common in the electrical and computer engineering professions. A comprehensive foundation in mathematics and the physical sciences in the freshman year is followed in subsequent years by additional core courses in mathematics, physics, electric circuit theory, digital logic, computer systems, electronics, linear systems, and mechanics. Laboratory work is designed to demonstrate fundamental principles and to provide experience in designing and testing electronic hardware and computer software. Both curricula have required senior design courses which give students comprehensive experience in designing, building and testing physical systems.

CURRICULA

In addition to the core courses described above, students in the electrical engineering curriculum take courses in electromagnetic fields and solid-state devices or electric power systems in their junior year and thermodynamics in their senior year. Students must take four courses of their choice in their senior

year from more that 20 elective courses offered in communications, control systems, digital systems, electric power systems, electromagnetics, microelectronics, and robotics.

In addition to the core courses described above, students in the computer engineering curriculum take courses in discrete mathematics, design of complex digital systems, advanced programming, operating systems, and data structures in their sophomore and junior years. Students must take three courses of their choice in the senior year. A variety of elective courses are offered in communications, controls, digital systems, microelectronics, and VLSI design. In addition, several senior-level courses in computer science are approved as elective courses for computer engineering.

CURRICULUM IN ELECTRICAL ENGINEERING
Degree earned: B.S. in Electrical Engineering

FRESHMAN YEAR

Fall Semster	*Credits*	*Spring Semester*	*Credits*
CH 101 General Chemistry I	3	CSC 114 Intro. to Comp - C++	3
CH 121 General Chemstry I Lab	1	ENG 112 Comp. & Reading	3
E 100 Intro. to COE	0	MA 241 Analytic Geom. & Calculus II	4
E 115 Intro. to Computing Environ.	1	PY 205 Physics for Engr. & Sc. I	4
ENG 111 Comp. & Rhetoric	3	Physical Education	1
MA 141 Analytic Geom. & Calculus I	4		**15**
Humanities/Soc.Sci. Elective	3		
Any 100-level PE in Fitness & Wellness	1		
	16		

SOPHOMORE YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
COM 110 Public Speaking	3	CE 213 Introduction to Mechanics	3
ECE 211 Electric Circuits I	3	ECE 212 Fund. Logic Design	3
ECE 213 Electric Circuits I Lab	1	ECE 214 Fund. Logic Design Lab	1
MA 242 Analytical Geom. & Calc. III	4	ECE 221 Electric Circuits II	3
PY 208 Physics Engrs. & Sci. II	4	ECE 223 Electric Circuits II Lab	1
	15	MA 341 Differential Equations	3
		Humanities/Social Science Elective	3
			17

JUNIOR YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
ECE 301 Linear Systems	3	ECE 218 Comp. Org. & Microproc.	3
ECE 303 Electromagnetic Flds.	3	ECE 305 Electric Pwr. Sys. or	
ECE 314 Electronic Circuits	3	ECE 341 Solid State Devices	3
MA 302 Num. Appl. to Diff. Equations	1	ENG 331 Comm. for Engr. & Tech.	3
MAE 301 Engr. Thermodynamics I	3	ST 370 Prob. & Stat. for Engr.	3
Humanities/Soc.Sci. Elective	3	Humanites/Soc.Sci. Elective	3
	16		**15**

SENIOR YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
COM 301 Presentational Speaking	3	ECE 480 EE Sr. Design Elective	4
Approved Tech. Elective	3	Sr. Design Elective or	
Sr. ECE Design Elective	3	Approved Dept. Elective	3
Sr. ECE Design Elective	3	Approved Dept. Elective	3
Humanities/Soc.Sci. Elective	3	Humanities/Soc.Sci. Elective	3
	15	Humanities/Soc.Sci. Elective	3
			16

Total Hours Required for Graduation: 125*

Note: All students who graduate from this curriculum must demonstrate competency in a foreign language at the 102 level.

CURRICULUM IN COMPUTER ENGINEERING
Degree earned: B.S. in Computer Engineering

FRESHMAN YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
CH 101 General Chemistry I	3	CSC 114 Intro. to Computing - C++	3
CH 121 General Chemistry I Lab	1	ENG 112 Comp. & Reading	3
E 100 Intro. to COE	0	MA 241 Analytic Geom. & Calculus II	4
E 115 Intro. to Computing Environ.	1	PY 205 Physics for Engr. & Sc. I	4
ENG 111 Comp. & Rhetoric	3	Physical Education	1
MA 141 Analytic Geom. & Calculus I	4		**15**
Humanities/Soc.Sci. Elective	3		
Any 100-level PE course in Fitness & Wellness	1		
	16		

SOPHOMORE YEAR

Fall Semester	*Credits*	*Spring Semster*	*Credits*
CSC 210 Concepts of Prog. Lang.	3	CSC 222 Discrete Math Structures	3
ECE 212 Fund. of Logic Des.	3	ECE 211 Elect. Circuits I	3
ECE 214 Fund of Logic Des. Lab	1	ECE 213 Elect. Circuits I Lab	1
MA 242 Analytic Geom. & Calculus III	4	ECE 218 Comp. Org. & Microproc.	3
PY 208 Physics for Engr. & Sc. II	4	MA 341 Applied Diff. Equations	3
	15	Humanities/Soc.Sci. Elective	3
			16

JUNIOR YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
CSC 202 Concep. & Fac. of Op. Sys.	3	CSC 311 Data Structures	3
ECE 221 Elect. Circuits II	3	ECE 301 Linear Systems	3
ECE 223 Elect. Circuits II Lab	1	ECE 314 Electronic Ckts.	3
ECE 342 Des. Complex Digit. Sys.	3	ENG 331 Comm. for Engr. & Tech.	3
ST 370 Prob. & Stat. for Engr.	3	MA 302 Numerical App. to Diff. Equations	1
Comm. Elective	3	Humanities/Social Science Elect.	3
	16		**16**

SENIOR YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
Approved Tech. Elective	3	ECE 481 CPE Senior Design Project	4
Senior Elective	3	CPE Senior Elective	3
Senior Design Elective	3	CPE Senior Elective	3
Humanities/Soc.Sci. Elective	3	Humanities/Soc.Sci. Elective	3
Humanities/Soc.Sci. Elective	3	Humanities/Soc.Sci. Elective	3
	15		**16**

Total Hours Required for Graduation: 125*

*Note: All students who graduate from this curriculum must demonstrate competency in a foreign language at the 102 level.

CURRICULUM FOR DUAL DEGREE: BS ELECTRICAL ENGINEERING/MS MANAGEMENT
Degrees earned: B.S. Electrical Engineering and M.S. Management

FRESHMAN YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
CH 101 General Chemistry I(1)	3	CSC 114 Intro. to Comp - C++	3
CH 121 General Chemistry I Lab(1)	1	ENG 112 Comp. & Reading	3
E 100 Intro. to COE	0	MA 241 Analytic Geom. & Calculus II(1)	4
E 115 Intro. to Computing Environ.	1	PY 205 Physics for Engr. & Sci. I(1)	4
ENG 111 Comp. & Rhetoric(1)	3	Physical Education	1
MA 141 Analytic Geom. & Calculus I	4		**15**
Humanities/Soc.Sci. Elective(3)	3		
Any 100-level PE in Fitness & Wellness(2)	1		
	16		

SOPHOMORE YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
COM 110 Public Speaking	3	CE 213 Intro. to Mechanics (4)	3
ECE 211 Electric Circuits I (1)	3	ECE 212 Fund. of Logic Des.(1)	3
ECE 213 Electric Circuits I Lab	1	ECE 214 Fund. of Logic Des. Lab	1
MA 242 Analytic Geom. & Calculus III	4	ECE 221 Electric Circuits II(1)	3
PY 208 Physics for Engr. & Sci. II	4	ECE 223 Electric Circuits II Lab	1
	16	MA 341 Applied Diff. Equations	3
		Humanities/Social Sciences Elective	3
			17

JUNIOR YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
ECE 301 Linear Systems	3	ECE 218 Comp. Org. & Microproc.(1)	3
ECE 305 Electric Power Systems or		ECE 303 Electromagnetic Fields	3
ECE 341 Solid State Devices	3	ENG 331 Comm. for Engr. & Tech.	3
ECE 314 Electronic Circuits	1	ST 370 Prob. & Statistics for Engineers(5)	3
MA 302 Num. Applic. to Diff. Equations	1	Humanities/Soc. Sci. Electives	3
MAE 301 Engr. Thermodynamics	3		**15**
EC 201 Economics I	3		
	16		

SENIOR YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
ACC 581 Financial Accounting	2	ECE 480 EE Sr. Design Project	4
ACC 582 Managerial Accounting	2	ECE 4**or 5** Master's Tech. Option	3
COM 301 Presentational Speaking	3	ECE 4**or 5** Master's Tech. Option	3
ECG 507 Microecon. & Bus. Environ.	2	ECG 508 Macroecon. & Bus. Environ.	2
Approved Technical Elective	3	Humanities/Soc. Sci. Elective	3
Senior ECE Design Elective	3		**15**
Senior ECE Design Elective	3		
	18		

FIFTH YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
BUS 501 Legal and Regulatory Environ.	2	BUS 532 Strategic Human Res. Mgmt.	2
BUS 502 Global and Cultural Environ.(9)	2	BUS 533 Leadership	3
BUS 521 Mangerial Finance	2	BUS 574 Management of Technology(9)	2
BUS 531 Managerical Proc. & Effectiveness	2	BUS 581 Long Range Analysis & Strat.	3
BUS 541 Mgmt. Info. Sys.	2	BUS 583 Management Practicum	1
BUS 561 Marketing Mgmt. & Strat.	2	ECE 5** Master's Technical Option	3
BUS 571 Operations Mgmt.	2		**14**
	14		

Total Hours Required for BSEE	**125**
Total Hours Required for MSM	**45**
Total Hours Required for both BSEE & MSM	**155**
Credits Counting Towards Both Degrees	**15**
Credits Required for MSM beyond BSEE	**30**

Notes:
*All students entering the program after the spring semester of 1994 must demonstrate proficiency in a foreign language at the FL_102 level for graduation.
*Students electing to take CE 215 or MAE 208 as a technical elective must take CE 214 or MAE 206 instead of CE 213.
*Master's Tech Option must be approved by the ECE Undergraduate Coordinator of Advising as Approved ECE Departmental Electives and by the student's master's program committee as appropriate Master's Technical Option courses
*The sequence, ECG 507 - ECG 508, satisfies the HSS requirement for an advanced social science course in economics for the BSEE program.
*The sequence, BUS 502 - BUS 574, satisfies the HSS requirement for a STS course for the BSEE program.
*Courses counting toward both degrees are ST 370(3), BUS 502 (1.5of 2.0), ECG 507 (1.5 of 2.0), ECG 508 (1.5 of 2.0), and ECE 4** or ECE 5** (6).

CURRICULUM FOR DUAL DEGREE: BS COMPUTER ENGINEERING/MS MANAGEMENT
Degree earned: B.S. Computer Engineering and M.S. Management

FRESHMAN YEAR

Fall Semester	**Credits**	**Spring Semester**	**Credits**
CH 101 Chemistry – A Molecular Science	3	CSC 114 Intro. to Computing – C++	3
CH 102 General Chemistry Lab	1	ENG 112 Composition & Reading	3
E 100 Intro. to COE	0	MA 241 Analytic Geometry & Calculus II	4
E 115 Intro. to Computing Environment	1	PY 205 Physics for Engr. & Sci. I	4
ENG 111 Composition & Rhetoric	3	Physical Education	1
MA 141 Analytic Geometry & Calculus I	4		**15**
Humanities/Social Science Elective	3		
Any 100-level PE crs. in Fitness & Wellness	1		
	16		

SOPHOMORE YEAR

Fall Semester	**Credits**	**Spring Semester**	**Credits**
CSC 210 Concepts of Prog. Lang.	3	CSC 222 Discrete Math Structures	3
ECE 212 Fund. of Logic Design	3	ECE 211 Electric Circuits I	3
ECE 214 Fund. of Logic Design Lab	1	ECE 213 Electric Circuits I Lab	1
MA 242 Analytic Geometry & Calculus III	4	ECE 218 Comp. Org. & Microproc.	3
PY 208 Physics for Engr. & Sci. II	4	MA 341 Applied Diff. Equations	3
	15	Humanities/Social Science Elective	3
			16

JUNIOR YEAR

Fall Semester	**Credits**	**Spring Semester**	**Credits**
CSC 202 Concep. & Fac. of Op. Systems	3	CSC 311 Data Structures	3
ECE 221 Electric Circuits II	3	ECE 301 Linear Systems	3
ECE 223 Electric Circuits II Lab	2	ECE 314 Electronic Ckts.	3
ECE 342 Des. Complex Digit Sys.	3	ENG 331 Comm. for Engr. & Tech.	3
ST 370 Prob. & Stat. For Engr.	3	MA 302 Numerical App. To Diff. Equations	1
Comm. Elective	3	EC 201 Economics I	3
	16		**16**

SENIOR YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
ACC 581 Financial Accounting	2	ECE 481 CPE Senior Design Project	4
ACC 582 Managerial Accounting	2	ECE 4** or 5** Master's Tech. Option	3
Humanities/Social Science Elective	3	ECE 4** or 5** Master's Tech. Option	3
EG 507 Microecon. & Bus. Environ.	2	ECG 508 Macroecon. & Business Environ.	2
Approved Technical Elective	3	Humanities/Social Science Elective	3
Senior ECE Design Elective	3		**15**
Senior ECE Elective	3		
	18		

FIFTH YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
BUS 501 Legal and Regulatory Environ.	2	BUS 532 Strategic Human Res. Mgmt.	2
BUS 502 Global and Cultural Environ.	2	BUS 533 Leadership	3
BUS 521 Managerial Finance	2	BUS 574 Management of Technolgy	2
BUS 531 Managerial Proc. & Effectiveness	2	BUS 581 Long Range Analysis & Strat.	3
BUS 541 Management Info. Sys.	2	BUS 583 Management Practicum	1
BUS 561 Marketing Mgmt. & Strat.	2	BUS 5** Master's Technical Option	3
BUS 471 Operations Mgmt.	2		**14**
	14		

Total Hours Required for BSCPE	**125***
Total Hours Required for MSM	**45**
Total Hours Required for both BSCPE & MSM	**155**
Credits Counting Towards Both Degrees	**15**
Credits Required for MSM beyond BSCPE	**30**

* Note: All students who graduate from this curriculum must demonstrate proficiency in a foreign language at the 102 level. Master's Tech. Option must be approved by the ECE Undergraduate Coordinator of Advising as Approved ECE
Departmental Electives and by the student's master's program committee as appropriate Master's Technical Option courses.

The sequence, ECG 507 – ECG 508, satisfies the HSS requirement for an advanced social science course in economics for the BSCPE program.
The sequence, BUS 502 – BUS 574, satisfies the HSS requirement for a STS course for the BSCPE program.
Courses counting toward both degrees are ST 307 (3), BUS 502 (1.5 of 2), BUS 574 (1.5 of 2), ECG 507 (1.5 of 2), ECG 508 (1.5 of 2), and ECE 4** or ECE 5** (6).

CURRICULUM FOR DUAL DEGREE: BS ELECTRICAL ENGINEERING/MS ELECTRICAL ENGINEERING
Degrees earned: B.S. Electrical Engineering and M.S. Electrical Engineering

FRESHMAN YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
CH 101 Chemistry – A Molecular Science	3	CSC 114 Intro. to Comp – C++	3
CH 102 General Chemistry Lab	1	ENG 112 Composition & Reading	3
E 100 Intro. to COE	0	MA 241 Analytic Geometry & Calculus II	4
E 115 Intro. to Computing Environment	1	PY 205 Physics for Engr. & Sci. I	4
ENG 111 Composition & Rhetoric	3	Physical Education	1
MA 141 Analytic Geometry & Calculus I	4		**15**
Humanities/Social Science Elective	3		
Any 100-level PE in Fitness and Wellness	1		
	16		

SOPHOMORE YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
COM 110 Public Speaking	3	CE 213 Introduction to Mechanics	3
ECE 211 Electric Circuits I	3	ECE 212 Fund. Logic Design	3
ECE 213 Electric Circuits I Lab	1	ECE 214 Fund. Logic Design Lab	1
MA 242 Analytic Geometry & Calculus III	4	ECE 221 Electric Circuits II	3
PY 208 Physics Engrs. & Sci. II	4	ECE 223 Electric Circuits II Lab	1
	15	MA 341 Differential Equations	3
		Humanities/Social Science Elective	3
			17

JUNIOR YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
ECE 301 Linear Systems	3	ECE 218 Comp. Org. & Microproc.	3
ECE 303 Electromagnetic Flds.	3	ECE 305 Electric Pwr. Sys. or	
ECE 314 Electronic Circuits	3	ECE 341 Solid State Devices	3
MA 302 Num. Appl. To Diff. Equations	1	ENG 331 Comm. for Engr. & Tech.	3
MAE 301 Engr. Thermodynamics I	3	ST 370 Prob. & Stat. for Engr.	3
Humanities/Social Science Elective	3	Humanities/Social Science Elective	3
	16		**15**

SENIOR YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
COM 301 Presentational Speaking	3	ECE 480 EE Sr. Design Elective	4
Approved Tech. Elective	3	Graduate Elective	3
Graduate Elective	3	Graduate Elective	3
Graduate Elective	3	Humanities/Social Science Elective	3
Humanities/Social Science Elective	3	Humanities/Social Science Elective	3
	15		**16**

FIFTH YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
Graduate Electives	9	Graduate Electives	9
	9		**9**

Total Hours Required for BSEE	**125***
Total Hours Required for MSEE	**30**
Total Hours Required for both BSEE & MSEE	**143**
Credits Counting Towards Both Degrees	**12**
Credits Required for MSEE beyond BSEE	**18**

*Note: All students who graduate from this curriculum must demonstrate proficiency in a foreign language at the 102 level.

The first 12 hours of graduate electives must be approved by the ECE Undergraduate Coordinator of Advising.

CURRICULUM FOR DUAL DEGREE: B.S. COMPUTER ENGINEERING/M.S. COMPUTER ENGINEERING
Degrees earned: B.S. Computer Engineering and M.S. Computer Engineering

FRESHMAN YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
CH 101 Chemistry – A Molecular Science	3	CSC 114 Intro. to Computing – C++	3
CH 102 General Chemistry Lab	1	ENG 112 Comp. & Reading	3
E 100 Intro. to COE	0	MA 241 Analytic Geom. & Calculus II	4
E 115 Intro. to Computing Environ.	1	PY 205 Physics for Engr. & Sci. I	4
ENG 111 Composition & Rhetoric	3	Physical Education	1
MA 141 Analytic Geometry & Calculus I	4		**15**
Humanities/Social Science Elective	3		
Any 100-level PE in Fitness & Wellness	1		
	16		

SOPHOMORE YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
CSC 210 Concepts of Prog. Lang.	3	CSC 222 Discrete Math Structures	3
ECE 212 Fund. of Logic Des.	3	ECE 211 Elect. Circuits I	3
ECE 214 Fund. of Logic Des. Lab	1	ECE 213 Elect. Circuits I Lab	3
MA 242 Analytic Geom. & Calculus III	4	ECE 218 Comp. Org. & Microproc.	3
PY 208 Physics for Engr. & Sci. II	4	MA 341 Applied Diff. Equations	1
	15	Humanities/Social Science Elective	3
			16

JUNIOR YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
CSC 202 Concep. & Fac. of Op. Sys.	3	CSC 311 Data Structures	3
ECE 221 Elect. Circuits II	3	ECE 301 Linear Systems	3
ECE 223 Elect. Circuits II Lab	1	ECE 314 Electronic Ckts.	3
ECE 342 Des. Complex Digit. Sys.	3	ENG 331 Comm. for Engr. & Tech.	3
ST 370 Prob. & Stat. for Engr.	3	MA 302 Numerical App. to Diff. Equations	1
Comm. Elective	3	Humanities/Social Science Elective	3
	16		**16**

SENIOR YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
Approved Tech. Elective	3	ECE 481 CPE Senior Design Project	4
Graduate Elective	3	Graduate Elective	3
Graduate Elective	3	Graduate Elective	3
Humanities/Social Science Elective	3	Humanities/Social Science Elective	3
Humanities/Social Science Elect4ive	3	Humanities/Social Science Elective	3
	15		**16**

FIFTH YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
Graduate Electives	9	Graduate Electives	9
	9		9

Total Hours Required for BSCPE	**125***
Total Hours Required for MSCPE	**30**
Total Hours Required for both BSCPE & MSCPE	**143**
Credits Counting Towards Both Degrees	**12**
Credits Required for MSCPE beyond BSCPE	**18**

*Note: All students who graduate from this curriculum must demonstrate proficiency in a foreign language at the 102 level.
The first 12 hours of graduate electives must be approved by the ECE Undergraduate Coordinator of Advisisng.

DEPARTMENT OF INDUSTRIAL ENGINEERING

www.ie.ncsu.edu/

Riddick Engineering Laboratories, Room 328
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C. L. Smith, *Assistant Head and Director of Undergraduate Programs*
J. R. Wilson, *Director of Graduate Programs*

Henry A. Foscue Professor: C.T. Culbreth; *University Professor:* S.E. Elmaghraby; *Walter Clark Professor:* S.C. Fang; *James T. Ryan Professor:* T.J. Hodgson; *Professors:* M.A. Ayoub, R.H. Bernhard, R.E. King, W.L. Meier, H.L.W. Nuttle, R.G. Pearson, S.D. Roberts, J.R. Wilson;*Professors Emeriti:* R.E. Alvarez, C.A. Anderson, J.R. Canada, R.W. Llewellyn, A. L. Prak, W.A. Smith, Jr.;*Associate Professors:* Y. Fathi, M.G. Kay, G.A. Mirka, E.T. Sanii, R.E. Young; *Assistant Professors:* D.R. Cormier, Y.S. Lee, J.B. Taylor, C.M. Sommerich; *Lecturer:* C.L. Smith.

The industrial engineer designs, improves, and installs integrated systems of people, materials, equipment, and information, drawing upon specialized knowledge and skill in the mathematical, physical and social sciences, together with the principles and methods of engineering analysis and design to specify, predict and evaluate the results to be obtained from these systems. Productivity, cost, quality, and time are the principal concerns. While industrial engineering is focused on the manufacturing enterprise, industrial engineers are widely employed in service industries including hospitals, banks, insurance, and government, owing to the emphasis on systems engineering. Because industrial engineering concentrates on management systems, IE's are quick to move into management and they are ideal candidates for management consulting firms.

The curriculum blends a basic group of common engineering technical courses with specialized courses in the major design areas of industrial engineering consisting of manufacturing operations, human-based workplaces, production systems, and management control. The course offerings stress mathematical and statistical techniques of systems analysis; computing as a tool for problem-solving and simulation; economic analysis of processes; control of process, product, or service quality and production; manufacturing process specification; and workplace design for ergonomic health and safety.

The Bachelor of Science in Industrial Engineering, Furniture Manufacturing prepares graduates for both engineering and managerial positions in the furniture industry. The furniture industry is one of the largest industries in North Carolina. The curriculum offers industrial engineering students a concentrated study of the materials, products, and processes of the furniture industry.

CURRICULUM IN INDUSTRIAL ENGINEERING
Degree earned: B.S. in Industrial Engineering

FRESHMAN YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
CH 101 Chemistry - A Molecular Science	3	CSC 114 Intro. to Comp. - C++	3
CH 102 General Chemistry Lab	1	ENG 112 Comp. & Reading	3
E 100 Intro. to COE	0	MA 241 Calculus II	4
E 115 Intro. to Computing Environ.	1	PY 205 Physics for Engr. & Sc. I	4
ENG 111 Comp. & Rhetoric	3	Physical Education	1
MA 141 Calculus I	4		15
Humanities/Soc.Sci. Elective	3		
Any 100-level PE in Fitness & Wellness	1		
	16		

SOPHOMORE YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
IE/CG 210 Engr. Graphics	3	ECE 331 Prin. of Electrical Engr.	3
CE 214 Engr. Mechanics-Statics	3	MA 303 Linear Analysis	3
MA 242 Calculus III	4	MAT 200 Struc. & Prop. Engr. Materials	3
PY 208 Physics for Engr. & Sci. II	4	ST 372 Intro. Stat. Infer. & Regres.	3
ST 371 Intro. Prob. & Dist. Theory	3	Engr. Science Elective	3
	17	IE 216 Manufacturing Engr. Practicum	3
			18

JUNIOR YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
ENG 331 Comm. for Engr. & Tech.	3	IE 416 Mfg. Engr. II - Automation	3
IE 316 Mfg. Engr. I - Processes	3	IE 352 Work Analysis & Design	3
IE/CSC 441 Work Analysis & Design	3	IE 443 Quality Control	3
IE 361 Deter. Models in IE	3	IE 452 Ergonomics	3
Humanities/Soc.Sci. Elective	3	Humanities/Soc.Sci. Elective	3
	15		**15**

SENIOR YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
IE 308 Cont. of Prod. & Ser. Sys.	3	IE 498 Senior Design Project	3
IE 311 Engr. Economic Analysis	3	IE 401 Stochastic Models in IE	3
IE 417 Mfg. Engr. III - CM	3	Humanities/Soc.Sci. Elective	3
IE 452 Facilities Design	3	Humanities/Soc.Sci. Elective	3
Humanities/Soc.Sci. Elective	3	Humanities/Soc.Sci. Elective	3
	15		**15**

Total Hours Required for Graduation: 126*

*Note: All students who graduate from this curriculum must demonstrate competency in a foreign language at the 102 level.

MINOR IN INDUSTRIAL ENGINEERING

The minor in Industrial Engineering is designed to provide undergraduate engineering students and other science majors in curricula other than Industrial Engineering with the fundamentals of industrial engineering necessary for advanced study in the discipline and/or employment in industrial engineering related occupations. The minor in Industrial Engineering offers a structured program that allows students to acquire some level of expertise in areas common to all industrial engineers as well as a deeper knowledge in at least one specific area of interest.

This minor requires a minimum of 15 credit hours. Required credit hours total six and consist of IE 311 and any 400-level IE course. Elective hours total nine and must come from remaining IE designated courses. The GPA for the minor courses must be at least 2.0. Applications may be obtained from the Department of Industrial Engineering Undergraduate Office.

MINOR IN FURNITURE MANUFACTURING

The minor in Furniture Manufacturing is open to all undergraduate degree students at NC State who are interested in gaining specialized knowledge of furniture product engineering and related manufacturing processes and design. A set of four cohesive courses provides for a concentrated study of this manufacturing industry as well as the application of industrial engineering fundamentals.

This minor requires a minimum of 15 credit hours. Required credit hours total 12 and consist of IE 240, IE 241, IE 340, and IE 341. Elective hours total three and must come from the following: IE 307, IE 308, IE 311, IE 352, IE 361, IE 441, IE 443, or IE 452. The GPA for the minor courses must be at least 2.0. Applications may be obtained from the Department of Industrial Engineering Undergraduate Office.

CURRICULUM IN INDUSTRIAL ENGINEERING, Furniture Manufacturing
Degree earned: B.S. in Industrial Engineering, Furniture Manufacturing

FRESHMAN YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
CH 101 General Chemistry I	3	CSC 114 Intro. to Comp. - C++	3
CH 121 General Chemistry I Lab	1	ENG 112 Comp. & Reading	3
E 100 Intro. to COE	0	MA 241 Analytic Geom. & Calculus II	4
E 115 Intro. to Computing Environ.	1	PY 205 Physics for Engr. & Sci. I	4
ENG 111 Comp. & Rhetoric	3	Physical Education	1
MA 141 Analytic Geom. & Calculus I	4		**15**
Humanities/Soc.Sci. Elective	3		
Any 100-level PE in Fitness & Wellness	1		
	16		

SOPHOMORE YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
CE 214 Engr. Mechanics-Statics	3	ECE 331 Principle of Electrical Engr.	3
IE/GC 210 Engr. Graphics	3	MA 303 Linear Analysis	3
MA 242 Analytic Geom. & Calculus III	4	ST 372 Intro. Stat. Infer. & Regres.	3
PY 208 Physics for Engr. & Sci. II	4	Engr. Science Elective	3
ST 371 Intro. Prob. & Dist. Theory	3	Humanities/Soc.Sci. Elective	3
	17		**15**

JUNIOR YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
ENG 331 Comm. for Engr. & Tech.	3	IE 241 Furn. Mfg. Proc. I	3
IE 240 Furn. Prod. Engr.	3	IE 352 Work Analysis & Design	3
IE 441 Intro. to Simulation	3	IE 443 Quality Control	3
IE 361 Deter Models in IE	3	IE 452 Ergonomics	3
Humanities/Soc.Sci. Elective	3	Humanities/Soc.Sci. Elective	3
	15		**15**

SENIOR YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
IE 308 Cont. of Prod. & Ser. Sys.	3	IE 498 Senior Design Project	3
IE 311 Engr. Economic Analysis	3	IE 341 Furn. Plant Layout	3
IE 340 Furn. Mfg. Proc. II	3	Humanities/Soc.Sci. Elective	3
IE 417 Mfg. Engr. III - Automation	3	Humanities/Soc.Sci. Elective	3
Humanities/Soc.Sci. Elective	3		**12**
	15		

Total Hours Required for Graduation: 125*

Note: All students who graduate from this curriculum must demonstrate proficiency in a foreign language at the 102 level.

COMBINED B.S.-MIE/MSIE in Industrial Engineering PROGRAM

This program will allow students to complete both undergraduate and graduate degrees within five years. The student may elect to pursue the Traditional BS or Combined BS-MIE/MSIE Program at the start of their senior year. The student is allowed *up to 12 credit hours* to be counted towards *both* the undergraduate and graduate degrees. In addition, up to 6 credit hours of graduate level classes earned as an undergraduate may be applied toward the Master's degree for a maximum total of 18 credits; thereby, shortening the time required to earn the Master's degree.

Requirements:

1. Have completed 92 credit hours (i.e. Senior) by the end of the current semester (includes transfer credits.)
2. Earned a GPA of at least 3.25 for all courses and 3.25 for all Industrial Engineering courses.
3. Satisfied all prerequisite requirements for 400 level courses.
4. A letter of recommendation from the undergraduate teaching advisor identifying the applicant as participation in the BS-MS/MSIE program should accompany the application as well as the course numbers and titles of the 12 credits hours to be used for both the Bachelor's and Master's degree programs.

Whether in the traditional BS or Combined BS-MIE/MSIE, ABET and University requirements will be satisfied based upon the four (4) year curriculum.

DEPARTMENT OF MATERIALS SCIENCE AND ENGINEERING

www.mse.ncsu.edu/

Riddick Engineering Laboratories, Room 229
Phone: (919) 515-2377

J. M. Rigsbee, *Head*
C. C. Koch, *Associate Head, and Director of Graduate Programs*
D. M. Maher, *Director of Undergraduate Programs*

Kobe Steel Professor: R.F. Davis; *University Distinguished Professor* : J. Narayan; *Distinguished Research Professor*: J.J. Cuomo; *Professors*: K. Bachmann, R.B. Benson Jr., N. El-Masry, J.J. Hren, A.I. Kingon, C.C. Koch, K.L. Murty, J.M. Rigsbee, G.A. Rozgonyi, P.E. Russell, R.O. Scattergood; *Professors Emeriti*: W.W. Austin, H. Conrad, A.A. Fahmy, J.K. Magor, K.L. Moazed, H. Palmour III, H.H. Stadelmaier, R.F. Stoops; *Visiting Professors*: J.Russ, R.B.Tippin; *Adjunct Professors*: O. Auciello, G.L. Doll, J.T. Glass, J.T. Prater, R. Reeber, F. Shimura; *Research Professor* : D. Maher; *Associate Professors*: C.M. Balik, D.W. Brenner, J. Kasichainula, Z. Sitar, R. Spontak; *Associate Professor Emeritus*: J. Hamme; *Visiting Associate Professor* : D. Griffis; *Adjunct Associate Professor* : S. Smith; *Lecturer* : T.M. Hare; *Adjunct Lecturer*: C. Chiklis; *Associate Members of the Faculty*: D. Aspnes (Physics), J.A.Bailey (Mechanical and Aerospace Engineering), S.M.Bedair (Electrical and Computer Engineering), K.S. Havner (Professor of Civil Engineering), Y. Horie (Civil Engineering), H. Lamb (Chemical Engineering), G. Lucovsky (Physics), R.J. Nemanich (Physics), G. Parsons (Chemical Engineering), A. Reisman (Electrical and Computer Engineering), I. Rovner (Sociology and Anthropology), V.T. Stannett (Chemical Engineering) *Interinstitutional Adjunct Faculty*: J. Sankar (NC A&T State University).

The Department of Materials Science and Engineering offers programs to qualify graduates for positions in industry, R&D laboratories, educational institutions, and governmental agencies. This basic education involves design, development, selection, and processing of engineered materials. Industries served by materials science and engineering graduates are aerospace, automotive, chemical and chemical processing, communications, construction materials, electronics, energy production, manufacturing, nuclear, and transportation.

OPPORTUNITIES

The continuing industrial and technological growth of the United States, the general southeast, and in particular the State of North Carolina has been marked by a strong and increasing demand for materials scientists and engineers. Modern technological advances require new materials and novel processing and/or fabrication methods. At the national level, materials research is prominently mentioned in most lists of critical or enabling technologies. As our understanding of materials science advances, common features and elements tend to unite many different industries. As an example, consider that our current knowledge of silicon is necessary in the electronics, photovoltaics, optical fiber technologies, lasers, pollution control, and biomedical industries. Advanced understanding of polymers also crosses and unites several different industries such as plastics, textiles, electronics, and recycling.

Education in materials science and engineering provides career opportunities in a wide range of industries from those which produce and/or use metals, glass, polymers, or ceramics, to those which use such materials in an integrated fashion such as the microelectronics industry. These opportunities include careers in research and development of new materials, new processes for producing them, failure analysis, product design and reliability, and technical

management at all levels of business. The importance and growth potential of the materials science and engineering discipline is reflected by a recent U.S. Department of Labor study which predicts that over the next decade the demand for materials engineers and scienstists will exceed that of any other engineering discipline.

CURRICULA

The materials scientist and engineer must understand the wide range of phenomena that occur in all classes of materials: metals, ceramics, polymers, composites, and electronic materials. The undergraduate curriculum is designed to provide balance by addressing the scientific and engineering principles applicable to all classes of materials as well as the particular engineering and design concepts unique to each class of material. Further emphasis in a specific area is provided by choosing one technical elective dealing with processing (metallic or ceramic materials) and one technical elective dealing with specific applications (composite materials or electronic materials). The basic science elective allows students to gain ore fundamental knowledge in either solid state theory, organic, or physical chemistry. The required senior design sequence (MAT 423-424) serve as capstone courses and provides a strong preparation for dealing with real industrial situations. MAT 423 covers open-ended classroom exposures and participatory involvement in group dynamics and proposal preparation. MAT 424 provides direct involvement with an industrial sponsor working on real problems submitted by industry. The remaining required courses are distributed among mathematics, physical sciences, and the humanities and social sciences.

The materials science and engineering program, which is accredited by the Engineering Accreditation Commission of the Accreditation Board for Engineering and Technology (ABET), leads to the degree Bachelor of Science in Materials Science and Engineering. A fifth year professional program is available for the advanced study and further specialization. Graduate degrees are also offered (consult the *Graduate Catalog*).

CURRICULUM IN MATERIALS SCIENCE AND ENGINEERING
Degree earned: B.S. in Materials Science and Engineering

FRESHMAN YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
CH 101 General Chemistry I[1]	3	CH 201 Prin. of Chemistry	3
CH 121 General Chemistry I Lab	1	CH 202 Prin. of Chemistry Lab **or**	1
E 100 Intro. to COE	0	CSC 110 Intro. to Comp. - PASCAL **or**	(3)
E 115 Intro. to Computing Environ.	1	CSC 112 Intro. to Comp. - FORTRAN **or**	(3)
ENG 111 Comp. & Rhetoric[1]	3	CSC 114 Intro. to Comp. - C++	(3)
MA 141 Analytic Geom. & Calculus I	4	ENG 112 Comp. & Reading	3
Humanities/Soc.Sci. Elective	3	MA 241 Analytic Geom. & Calculus II[1]	4
Any 100-level PE course in Fitness & Wellness	1	PY 205 Physics for Sci. Engrs. I[1]	4
	16		**14-15**

SOPHOMORE YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
CSC 110/112/114 Intro. Computing **or**	3	MA 341 Appl. Diff. Equations	3
CH 107 Prin. of Chemistry	3	MAT 210 Exp. in Materials Engr.	2
CH 127 Prin. of Chemistry Lab	1	MAT 225 Chem. of Polymeric Materials	2
MA 242 Analytic Geom. & Calculus III	4	MAT 301 Equil. & Rate Processes	3
MAT 201 Struct. & Prop. Engr. Materials[2]	3	Basic Science Elective[4]	3-4
PY 208 Physics for Engr. & Sci. II	4	Physical Education Elective	1
Humanities/Soc.Sci. Elective	3		**14-15**
	17-18		

JUNIOR YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
MAT 310 Comp. Usage in Materials	2	MAT 321 Phase Trans. & Diffus.	3
MAT 324 Polymer Char. Lab	1	MAT 331 Electronic Prop. of Materials	3
MAT 330 Crystal Ch. & Phase Equil.	3	MAT 333 Electronic Prop. Lab	1
MAT 350 Mechanics Prop. Of Materials I	3	MAT 434 Ceramic Engr. Lab	1
MAT 425 Intro. to Polym. Materials	3	MAT 435 Physical Ceramics	3
Advanced Writing Elective[5]	3	MAT 450 Mechanics Prop. of Materials II	3
	15	Humanities/Soc.Sci. Elective	3
			17

SENIOR YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
MAT 423 Intro. to Materials Engr. Design	3	ECE 331 Principle Elect. Engr. I	3
MAT 430 Physical Metallurgy Lab	1	MAT 424 Sr. Design Project	3
MAT 431 Physical Metallurgy I	3	MAT 491 Materials Engr. Seminar[7]	1
Ist Materials Technical Elective[6]	3	2nd Materials Tech. Elective[6]	3
Humanities/Soc.Sci. Elective[3]	3	Humanities/Soc.Sci. Elective[3]	3
Humanities/Soc.Sci. Elective[3]	3	Humanities/Soc.Sci. Elective[3]	3
	16		**16**

Total Hours Required for Graduation: 126[8]

*Note: All students must demonstrate proficiency in a foreign language at the FL_102 level for graduation.
All students in Matcrial Science and Engineering must take both CH 107 and, either CSC 110 or CSC 112 or CSC 114.
[1]A "C" or better must be earned in these courses. This is a graduation requirement and they must be satisfied in order for an engineering student to be eligible to enroll in a 200 or higher level course in the College of Engineering.

[2]A "C" or better must be earned in these courses. This is a departmental graduation requirement.
[3]Humanities and Social Sciences courses to be selected from appropriate list approved by the College of Engineering .
[4]CH 220, CH 437, or PY 407.
[5]Either ENG 331 or ENG 333.
[6]Fall: MAT 440, MAT 445, or MAT 475. Spring: MAT 460 or MAT 556.
[7]MAT 491 Seminar may be taken either semester of senior year.
[8]Credits for the first two PE courses do not count towards the minimum credits required for graduation.

MINOR IN MATERIALS SCIENCE AND ENGINEERING

The Minor in Materials Science and Engineering is designed to provide undergraduate engineering students and other science majors in curricula *other* than Materials Science and Engineering with the fundamentals of modern materials science and engineering. The Minor in Materials Science and Engineering offers a concentration in basic principles and a choice of specific areas of interest including ceramic, polymeric, metallic, or electronic materials. This minor requires 17-19 hours of concentration including MAT 201 and MAT 210. The GPA for Minor courses must be a least 2.0. Further information regarding a Minor in Materials Science and Engineering is available from the Director Undergraduate Programs.

MAT 201 (3) Structure and Properties of Engineering Materials
MAT 210 (2) Experiments in Materials Engineering
MAT 330 (3) Crystal Chemistry and Phase Equilibria
MAT 321 (3) Phase Transformations and Diffusion
MAT *** (6-8) Approved Electives**

Polymeric Materials**	Ceramic Materials**	Metallic Materials**	Electronic Materials**
MAT 225 (2)*	MAT 435 (3)	MAT 431 (3)	MAT 331 (3)
MAT 425 (3)	MAT 445 (3)	MAT 440 (3)	MAT 460 (3)
MAT 475 (3)			

*ChE and other majors who have taken Organic Chemistry do not have to take this course.

DEPARTMENT OF MECHANICAL AND AEROSPACE ENGINEERING

www.mae.ncsu.edu/

Broughton Hall, Room 3211
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F. R. DeJarnette, *Head and Director of Aerospace Engineering Program*
F.Y. Sorrell, *Director of Mechanical Engineering Program*
J. C. Mulligan, *Director of Graduate Programs*
A. S. Boyers, *Undergraduate Administrator*
M. L. Gonzalez, *Coordinator of Advising*

Alumni Distinguished Undergraduate Professors: E.M. Afify, M.A. Boles, R.R. Johnson;*Alumni Distinguished Graduate Professors:* F.R. DeJarnette, H.A. Hassan; *R. J. Reynolds Industries Professor:* C.F. Zorowski; *Professors:* J.A. Bailey, T.A. Dow, R.F. Keltie, C. Kleinstreuer, G.K. Lee, C.J. Maday, D.S. McRae, J.C. Mulligan, R.T. Nagel, L.H. Royster, L.M. Silverberg, F.Y. Sorrell, J.S. Strenkowski, G.D. Walberg;*Professor and Senior Extension Specialist:* H.M. Eckerlin; *Visiting Professor and Senior Extension Specialist:* M.M. Fikry; *Adjunct Professors:* J.P. Archie, Jr., A.E. Bayoumi, D.P. Dewitt, J. N. Juang, D.E. Klett, M.Y. Marov, E.R. McClure; *Professors Emeriti:* R.A. Burton, M.H. Clayton, J.A. Edwards, B.H. Garcia, Jr., W.C. Griffith, F.J. Hale, F.D. Hart, T.H. Hodgson, E.G. Humphries, M.N. Ozisik, F.O. Smetana, J.K. Whitfield;*Associate Professors:* N. Chokani, J.W. David, J.W. Eischen, R.D. Gould, C.E. Hall, Jr., J. Kasichainula, E.C. Klang, J.W. Leach, P.I. Ro, A.J. Shih, F.G. Yuan, M.A. Zikry;*Adjunct Associate Professors:* J.G. Cleland, P.B. Corson, L.P. Franzoni, J. H. Hebrank, K.R. Iyer, D.W. Lee, R.M. Potter;*Assistant Professors:* J.R. Edwards, Jr., A.V. Kuznetsov, K.M. Lyons, W.L. Roberts IV; *Adjunct Assistant Professors* D.P. Colvin, J.A. Cooke, B. Driehuys, K.J. Falter, A.O. Hobbs, S.D. Holland, M. M. Nazemi, M.A. Norris, M.T. Odman, D.J. Rossetti, S.E. Southward, M.R. Spano, R.J. Stanley; *Visiting Assistant Professors:* B. LaMattina, C.M. Tran; *Lecturers:* G.O. Batton, A.S. Boyers, M.L. Gonzalez, R.J. Vess; *Adjunct Lecturer:* D. H. Youden; *Lecturer Emeritus:* R.J. Leuba; *Adjunct Instructors:* J.G. Hart, H.G. Hoomani; *Interinstitutional Faculty:* M.J. Ruiz, G.A. Truskey, K.M. Whatley;*Faculty with Associat Status:* M.K. Ramasubramanian (Associate Professor, Wood and Paper Science), J.S. Stewart (Research Associate Professor, Wood and Paper Science).

Aerospace engineering has grown out of the challenge to design, construct, and operate vehicles ranging from helicopter and VSTOL to aircraft, rockets, and spacecraft. Each vehicle is a complex system involving aerodynamics, propulsion, materials, structures, and controls. Their design is difficult because they must be lightweight and also operate reliably and efficiently in the harsh environment encountered in space and planetary atmosphere as well as earth's atmosphere. Student projects related to space transportation and exploration are performed at the Mars Mission Research Center on the Centennial Campus.

Mechanical engineering involves practical application of mechanics and thermal sciences to research, design, development, testing, and manufacturing of a wide variety of products. The diverse areas to which mechanical engineers contribute include transportation, power generation and energy conversion, environmental control and pollution abatement, noise control, and biomechanics. Recent developments have increased interest in areas such as robotics, mechatronics, precision engineering, automated manufacturing systems, combustion, and propulsion. Student projects include min-Baja and Formula Cars and walking machines.

FACILITIES

Aerospace: Both computational and experimental laboratories are heavily involved in the program. Computational facilities include PC's, workstations, and access to supercomputers. Laboratories include subsonic and supersonic wind tunnels, propulsion systems, structures and controls labs. Senior design involves analysis, design, construction and flight testing of remotely piloted vehicles (RPV) or flight readiness checkout of a spacecraft mockup. An RPV flight facility with a paved runway is located in Butner, NC and spacecraft are constructed at the Mars Mission Research Center on the Centennial Campus.
Mechanical: The mechanical engineering program is comprehensive in that it consists of both analytical/numerical and experimental activities and laboratories. Computational facilities consist of three computer laboratories, using both UNIX and Windows NT platforms. Computational software available includes mathematical and solution algorithms, as well as modern design and analysis tools. The experimental laboratories include measurements and data analysis, performance evaluation of thermal systems and power plants, and testing and analysis of mechanical components. The senior design laboratory if jointly supported by the department and industry. This is a unique laboratory facility, which is the involvement of students in solving actual industrial problems by designing, building, and testing prototype machines. The laboratory facilities are supported by a machine shop and an electronics

facility. Also housed in the mechanical engineering program is the Applied Energy Research Laboratory (AERL), the Precision engineering Laboratory (PEC) and the Industrial Assessment Center (IAC).

OPPORTUNITIES

Aerospace: Aerospace engineering graduates are employed by governmental laboratories like NASA, Navy and Air Force, aerospace industries, or go to graduate school. Careers are available in private, commercial, and military aircraft and spacecraft industries. However, they are qualified for a wide variety of jobs and are often sought by other industries.

Mechanical: Because of the wide range of applications and needs, mechanical engineering is one of the broadest engineering disciplines, and thus offers a wide range of employment opportunities. The program provides students with the knowledge and experience that equips them to enter a wide range of functional areas, including design, development, manufacturing, plant operation, testing and experimentation, consulting, sales and service. Employment may readily be found in industry, government and service organizations. Students are also well prepared to enter graduate school to pursue advanced degrees in engineering, science or business, as well as professional degree programs wuch as medicine, accounting and law.

CURRICULA

Because of the close relationship between mechanical and aerospace engineering, both curricula are administered by one department. They are nearly the same for the freshman and sophomore years but quite different in the junior and senior years. Each program is designed to provide the student with an understanding of both the science on which the discipline if founded and the applied science and technology which characterizes its specific character. In addition the programs provide students with an opportunity to develop the skills for applying their acquired knowledge. The aerospace engineering and the mechanical engineering programs, which are accredited by the Engineering Accreditation Commission of the Accreditation Board for Engineering and Technology (ABET), lead to the degrees Bachelor of Science in Aerospace Engineering and Bachelor of Science in Mechanical Engineering, respectively. Graduate degrees are also offered (consult the *Graduate Catalog*).

CURRICULUM IN AEROSPACE ENGINEERING

Degree earned: B.S. in Aerospace Engineering

FRESHMAN YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
CH 101 General Chemistry I	3	CH 201 Chemistry A Quantitative Science	3
CH 102 General Chemistry I Lab	1	ENG 112 Comp. & Reading	3
E 100 Intro. to COE	0	MA 241 Analytic Geom. & Calculus II	4
E 115 Comp. & Rhetoric	1	PY 205 General Physics	4
ENG 111 Comp. & Rhetoric	3	Physical Education Elective	1
MA 141 Analytic Geom. & Calculus I	4		**15**
Humanites/Soc.Sci. Elective	3		
Any 100-level PE in Fitness & Wellness	1		
	16		

SOPHOMORE YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
CSC 112 Intro. to Comp. - FORTRAN	3	GC 211 Intro. Eng. Graphics MAE	3
MA 242 Analytic Geom. & Calculus III	4	MA 341 Applied Diff. Equations	3
MAE 206 Engr. Statics	3	MAE 208 Engr. Dynamics	3
PY 208 General Physics II	4	MAE 261 Aero. Vehicle Perf.	3
Humanities/Soc.Sci. Elective	3	MAE 314 Solid Mechanics	3
	17	MAT 201 Struc. Prop. of Engr. Materials	3
			18

JUNIOR YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
ENG 331 Comm. Engr. & Tech.	3	ECE 331 Principle Elect. Engr.	3
MAE 301 Engr. Thermodynamics I	3	MAE 356 Aerodynamics II	3
MAE 355 Aerodynamics I	3	MAE 358 Expt. Aero. II	1
MAE 357 Expt. Aero. I	1	MAE 462 Fli. Veh. Sta. & Control	3
MAE 371 Aero. Struc. I	3	MAE 472 Aero. Vehicle Struc. II	3
MAE 461 Dynamics & Controls	3	MAE 473 Aero. Vehicle Struc. II Lab	1
MAE 469 Controls Lab	1	Humanties/Soc.Sci. Elective	3
	17		**17**

SENIOR YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
MAE 455 Boundary Layer Theory	3	MAE 479 Aero. Vehicle Design II	3
MAE 475 Propulsion	3	Humanities/Soc.Sci. Elective	3
MAE 466 Expt. Aero. III	1	Humanities/Soc.Sci. Elective	3
MAE 478 Acro. Vehicle Design I	2	Humantiies/Soc.Sci. Elective	3
Departmental Elective	3		**12**
Humanities/Soc.Sci. Elective	3		
	15		

Total Hours Required for Graduation: 127*

*Note: All students who graduate from this curriculum must demonstrate proficiency in a foreign language at the 102 level.

CURRICULUM IN MECHANICAL ENGINEERING
Degree earned: B.S. in Mechanical Engineering

FRESHMAN YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
CH 101 General Chemistry I	3	CSC 112 Intro. to Comp - FORTRAN	3
CH 102 General Chemistry I Lab	1	ENG 112 Comp. & Reading	3
E 100 Intro. to COE	0	MA 241 Analytic Geom. & Calculus II	4
E 115 Comp. & Rhetoric	1	PY 205 General Physics	4
ENG 111 Comp. & Rhetoric	3	Physical Education Elective	1
MA 141 Analytic Geom. & Calculus I	4		**15**
Humanities/Soc.Sci. Elective	3		
Any 100-level PE in Fitness & Wellness	1		
	16		

SOPHOMORE YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
GC 101 Engr. Graphics	3	MA 341 Applied Diff. Equations	3
MA 242 Analytic Geom. & Calculus III	4	MAE 208 Engr. Dynamics	3
MAE 206 Engr. Statics	3	MAE 314 Solid Mechanics	3
PY 208 General Physics II	4	MAT 200 Mech. Prop. Engr. Materials	3
Humanities/Soc.Sci. Elective	3	Humanites/Soc.Sci. Elective	3
	17		**15**

JUNIOR YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
ENG 331 Comm. for Engr. & Tech.	3	ECE 331 Principle of Elect. Engr. I	3
MAE 301 Engr. Thermodynamics I	3	MAE 302 Engr. Thermodynamics II	3
MAE 305 ME Lab I	1	MAE 306 ME Lab II/TD	1
MAE 315 Dynamics of Machines	3	MAE 308 Fluid Mechanics	3
MAE 316 Strength fo Mechanics Comp.	3	MAE 310 Heat Transfer (Cond. & Rad.)	3
ST 370 Prob. & Stat. for Engrs.	3	Humanities/Soc.Sci. Elective	3
	16		**16**

SENIOR YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
IE 311 Engr. Econ. Analysis	3	MAE 412 Energy Systems	3
MAE 405 ME Lab III	1	MAE 416 ME Design	4
MAE 410 conv. Heat Trans. & Fl Flow	3	Department Elective	3
MAE 415 Mechanics Engr. Analysis	3	Humanties/Soc.Sci. Elective	3
MAE 435 Principle of Auto Control	3	Humanties/Soc.Sci. Elective	3
Humanitie/Soc.Sci. Elective	3		**16**
	16		

Total Hours Required for Graduation: 127*

*Note: All students who graduate from this curriculum must demonstrate competency in a foreign language at the 102 level.

DEPARTMENT OF NUCLEAR ENGINEERING

www.ne.ncsu.edu/

Burlington Engineering Laboratories, Room 1110
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D. J. Dudziak, *Head*
M. A. Bourham, *Coordinator of Advising*
K. Verghese, *Director of Graduate Programs*

Alumni Distinguished Undergraduate Professor: K. Verghese;*Alumni Distinguished Undergraduate Professor:*R.P. Gardner; *Professors:* M.A. Bourham, D.J. Dudziak, J.G. Gilligan, K.L. Murty, P.J. Turinsky; *Professors Emeriti:* T.S. Elleman, R.L. Murray, R.F. Saxe, E. Stam; *Adjunct Professors:* R.A. Gerwin, D.L. Morrison, M.S. Wechsler; *Associate Professor and Director of the Nuclear Reactor Program:* C.W. Mayo;*Associate Professors:* J.M. Doster, R.M. Mayo; *Adjunct Associate Professors:* Y. Azmy, A.M. Hassanein, T.H. Prettyman; *Assistant Professors:* O.E. Hankins, M.-S. Yim; *Adjunct Assistant Professors:* K.R. Earnshaw, D.J. Kropaczek, D.A. Petti; *Lecturer and Health Physicist:* G.D. Wicks; *Lecturer and Associate Director of Nuclear Reactor Program:* P.B. Perez; *Nuclear Services Manager:* J.N. Weaver.

Nuclear engineering is concerned with the engineering aspects of the control, release and utilization of nuclear energy from both fission and fusion. Nuclear reactors serve many functions-they serve as heat sources for electric power plants, are the basis of radioactive isotopes for a variety of peaceful applications. Nuclear methods are applied in medical diagnosis and treatment, scientific research, and the search for new resources. The nuclear engineering program educates individuals in scientific and engineering principles essential for effective and productive contributions in industrial, university and government service.

OPPORTUNITIES
Nuclear power reactor construction continues with over one hundred reactors operating in the nation, increasing our reliance upon nuclear energy as a substitute for energy from fossil fuels. Development of breeder and fusion reactors offers the potential of vast new energy sources. Industrial and medical applications of radiation continue to increase in divers industries. A demand for nuclear engineers exists within the electric power industry, national laboratories, Naval reactors, and other industries.

SCHOLARSHIPS AND AWARDS
Several special scholarships exist for NC State nuclear engineering students, including the Bechtel, Carolina Power and Light, Duke Power, Ebasco, Eastern Carolinas ANS, Piedmont ANS, Institute for Nuclear Power Operations, and American Nuclear Society scholarships. A special department fund supports scholarships for incoming freshmen and exceptional upperclassmen. NC State nuclear engineering students have received special recognition awards at the Undergraduate Research Symposium and have gained national recognition by several times receiving the Student Design Award of the American Nuclear Society. NC State nuclear engineering students are also frequent recipients of nationally awarded fellowships.

FACILITIES
Facilities for nuclear education include a nuclear research reactor (PULSTAT), which can be operated at a steady state power of 1 MW; the Scaled Pressurized Water Reactor facility (SPWR), an operating 1/9 scale model of a nuclear power plant; radiation detectors and multi-channel analyzers; nuclear materials laboratory; thermal hydraulic laboratory; prompt gamma facility; neutron radiography unit; numerous computer facilities including graphic terminals, numerous departmental computer workstations, sever College of Engineering EOS engineering workstations, and microcomputers; plasma diagnostics laboratory; neutron activation analysis laboratory; high- and low-level radiochemistry laboratories; simulation laboratory; and plasma science laboratory.

CURRICULUM
Nuclear engineers work in nuclear systems research, design, development, testing, operation, environmental protection, and marketing. The Bachelor of Science program prepares graduates for positions in industry, national laboratories, or for graduate study (consult the *Graduate Catalog*). The curriculum incorporates basic sciences and engineering, with emphasis on mathematics and physics, followed by course work in nuclear science and technology. Design concepts are introduced in numerous nuclear engineering courses throughout the curriculum to provide an integrated educational experience, capstoned by the senior nuclear reactors and radiation systems. **Attention is also given to the efficient utilization of energy resources and to the environmental aspects of nuclear energy. Computers are widely used throughout the curriculum.

The nuclear engineering program, which is accredited by the Engineering Accreditation Commission of the Accreditation Board for Engineering and Technology (ABET), leads to the degree of Bachelor of Science in Nuclear Engineering. Advanced undergraduates who desire to attend graduate school at NC State and specialize in the areas of Fission, Fusion/Plasma, or radiological Engineering may enter a combined BS/MNE professional program during their senior year which will culminate at the end of their fifth year with both the Bachelor of Science in Nuclear Engineering and the Master of Nuclear Engineering degrees.

CURRICULUM IN NUCLEAR ENGINEERING
Degree earned: B.S. in Nuclear Engineering

FRESHMAN YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
CH 101 Chemistry-A Molecular Science	3	CH 201 Chemistry-A Quant. Science	3
CH 101 General Chemistry I Lab	1	CH 202 General Chemistry II Lab	1
E 100 Intro. to COE	0	ENG 112 Comp. & Reading	3
E 115 Intro. to Computing Environ.	1	MA 241 Analytic Geom. & Calculus II	4
ENG 111 Comp. & Rhetoric	3	PY 205 General Physics for Engr. & Sci. I	4
MA 141 Analytic Geom. & Calculus I	4		**15**
Humanities/Soc.Sci. Elective*	3		
Any 100-level PE in Fitness & Wellness	1		
	16		

SOPHOMORE YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
CSC 112 Intro. to Comp - FORTRAN	3	CE 213 Intro. to Mechanics	3
MA 242 Analytic Geom. & Calculus III	4	MA 341 Applied Diff. Equations	3
NE 201 Intro. to Nuclear Engr.	2	NE 202 Fund. of Nuclear Engergy	4
PY 208 General Physics for Engr. & Sci. II	4	PY 407 Intro. to Modern Physics	3
Humanities/Soc.Sci. Elective*	3	Humanites/Soc.Sci. Elective*	3
	16		**16**

JUNIOR YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
MAE 301 Engr. Thermodynamics I	3	MA 401 Appl. Diff. Equations II	3
MAE 308 Fluid Mechanics	3	MAT 201 Struct. Prop. of Engr. Materials	3
NE 301 Fund. of Nuclear Engr.	4	NE 302 Nuclear React. Ener. Conver.	4
Spec/Writ/Foreign Lang. Elective*	3	NE 401 React. Analysis & Des.	4
Humanities/Soc.Sci. Elective*	3	Physical Education	1
	16		**15**

SENIOR YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
NE 402 Reactor Engr.	4	NE 403 Nuclear Engr. Design Project	3
NE 404 Radiation Safety & Shielding	3	NE or Tech. Elective*	3
NE 405 Reactor Systems	3	Tech. Elective*Elective	3
NE or Tech Elective*	3	Humanities/Soc.Sci. Elective*	3
Humanities/Soc.Sci. Elective*	3	Humanities/Soc.Sci. Elective*	3
	16		**15**

Total Hours Required for Graduation: 125*

*Note: All students who graduate from this curriculum must demonstrate competency in a foreign language at the 102 level.

TEXTILE ENGINEERING PROGRAM

www.tx.ncsu.edu/

Textile Building Centennial Campus, Room 3250
Phone: (919) 515-6638

K. R. Beck, *Head, Department of Textile Engineering, Chemistry, and Science*
T. G. Clapp , *Associate Head*
J. P. Rust, *Program Director*

(For a list of faculty, see College of Textiles, Department of Textile Engineering, Chemistry, and Science)

The textile and related industries represent a major part of the manufacturing segment of the American economy with the industry mainly concentrated in the Southeast. The textile industry of North Carolina comprises approximately one-fourth of the United States textile industry. Textile and related industries in North Carolina represent $100 million of payroll per week. Nationally, this number jumps to $550 million per week.

The textile industry is rapidly changing to become a capital intensive, high-technology industry. Applications of computers and robotics are commonplace in the modern plant. Textile engineering is concerned with the application of scientific principles and engineering practice to the design and control of all aspects of fiber, textile and apparel processes, products and machinery.
The Textile Engineering program, which is accredited by the Engineering Accreditation Commission of the Accreditation Board for Engineering and Technology (ABET), leads to the degree of Bachelor of Science in Textile Engineering.

FACILITIES AND SCHOLARSHIPS

(See College of Textiles)

OPPORTUNITIES

Because the modern production and utilization of textile materials require people highly competent in the areas of engineering, mathematics, science and technology, graduates of the Program are prepared for challenging careers in the primary textile, man-made fiber, apparel and nonwoven industries. Textile engineers have also been very successful in the textile machinery, automotive, biomedical, and aerospace industries and in a wide range of other service companies. Opportunities abound in plant engineering, quality engineering, production control, process engineering, and product development.

CURRICULUM

The Textile Engineering Program guides students to investigate how scientific principles and engineering practices can be applied to the diverse requirements of textile materials, processes, structures, and machinery. The program combines study of physical, mathematical, and social sciences with engineering analysis and design techniques as related to textile systems. Students study the interaction of fibers and fabrics with machinery and consider such issues as quality, safety, process control and project management. Completion of a B.S. in Textile Engineering provides the individual with a broad engineering background suited to addressing problems and needs in industry. Since training in textile engineering involves two distinct technical fields - textiles and engineering - the curriculum is a joint responsibility of the two Colleges.

CURRICULUM IN TEXTILE ENGINEERING

Degree earned: B.S. in Textile Engineering

FRESHMAN YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
CH 101 Chemistry - A Molecular Science[1]	3	CSC 114 Intro. to Comp. - C++[3]	3
CH 102 General Chemistry Lab[1]	1	ENG 112 Comp. & Reading	3
E 100 Intro. to COE	0	MA 241 Analytic Geom. & Calculus II[1]	4
E 115 Intro. to Computing Environ.	1	PY 205 General Physics for Engr. & Sci. I[1]	4
ENG 111 Comp. & Rhetoric[1]	3	Physical Education	1
MA 141 Analytic Geom. & Calculus[1] I	4		**15**
Humanities/Soc.Sci. Elective[2]	3		
Any 100-level PE in Fitness & Wellness	1		
	16		

SOPHOMORE YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
MA 242 Analytic Geom. & Calculus III	4	ECE 211 Electric Circuits I	3
MAE 206 Engr. Statics[1]	3	ECE 213 Electric Circuits I Lab	1
PY 208 General Physics for Engr. & Sci. II	4	MA 341 Appl. Diff. Equations	3
TC 203 Intro. to Polymer Ch.	3	MAE 208 Engr. Dynamics[1]	3
	14	TE 201 Polymer & Fib. Sc. & Engr.	3
		Humanites/Soc.Sci. Elective[2]	3
			16

JUNIOR YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
MAE 301 Engr. Thermodynamics I	3	ENG 331 Comm. for Engr. & Tech.	3
MAE 308 Fluid Mechanics I	3	ST 370 Prob. & Stat for Engr.	3
MAE 314 Solid Mechanics	3	TC 301 Tech. of Dyeing & Finish	4
TE 301 Textile Mfg. Proc. I	4	TC 302 Textile Mfg. Proc. II	4
TE 305 Textile Instr. & Controls	3	Humanities/Soc.Sci. Elective[2]	3
	16		**17**

SENIOR YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
TE 303 Textile Chem. Proc.	3	TE 402 Textile Engr. Design II	4
TE 401 Textile Engr. Design I	4	TE 404 Textile Engr. Quality Impr.	4
TE 403 Mechanics of Fiber Struct.	3	Humanities/Soc.Sci. Elective[2]	3
Humanities/Soc.Sci. Elective[2]	3	Humanities/Soc.Sci. Elective[2]	3
Humanities/Soc.Sci. Elective[2]	3		**14**
	16		

Total Hours Required for Graduation: 124[4]

*Note: Foreign language proficiency at the FL-102 level is required.
[1]Must be completed with grade of C or better.
[2]To be taken according to COE requirements.
[3]Students double majoring with MAE must substitute CSC 112 for CSC 114.
[4]Other graduation requirements include (a)2.0 overall GPA, or higher, on all course attempted at NCSU and (b) 2.0 GPA in major.

INDIVIDUALIZED DEGREE PROGRAM IN ENGINEERING

Page Hall, Room 120
Phone: (919) 515-3693

The B.S. in Engineering degree offers an individualized academic program for those exceptional students who have academic and career goals that cannot be accommodated by the other engineering degree programs. Before being admitted into the program, students must complete the freshmen year, have at least a 2.500 grade point average, have completed the requirements for admission into an engineering degree program and have a plan of study approved by the student's advisory committee and the Dean of Engineering. For information about the program, contact the Assistant Dean for Academic Affairs at 919-515-2315.

CURRICULUM IN ENGINEERING
Degree Earned: B.S. in Engineering

FRESHMAN YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
CH 101 Chemistry - A Molecular Science	3	CH 201 Chemistry - A Quantitative Science	3
CH 102 General Chemistry Lab	1	CH 202 Quantitative Chemistry Lab or	1
E 100 Intro. to Engineering	0	CSC 1xx Intro. to Computing Elective[2]	(3)
E 115 Intro. to Computing Environ.	1	ENG 112 Comp. & Reading	3
ENG 111 Comp. & Rhetoric	3	MA 241 Calculus II	4
MA 141 Calculus I	4	PY 205 Physics for Engr.& Sc I	4
Humanities/Soc.Sci Elective[1]	3	Physical Education Elective	1
Any 100-level PE in Fitness & Wellness	1		**16 (15)**
	16		

SOPHOMORE YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
MA 242 Calculus III	4	MA 341 Applied Diff. Equations	3
PY 208 Physics Engr. & Sci. II	4	Approved Elective[3]	3
Approved Elective[3]	3	Advised Elective[4]	3
Humanities/Soc.Sci Elective[1]	3	Engineering Concentration Elective[5]	3
	14	Humanities/Soc.Sci Elective[1]	3
			15

JUNIOR YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
Advised Statistics Elective[4]	3	Approved Elective[3]	3
Engineering Concentration Elective[5]	6	Approved Elective[3]	3
Advanced Writing or Speech Elective[6]	3	Engineering Concentration Elective[5]	6
Humanities/Soc.Sci Elective[1]	3	Humanities/Soc.Sci Elective[1]	3
	15		**15**

SENIOR YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
Advised Elective[4]	6	Approved Elective (Senior Design)[7]	3
Engineering Concentration Elective[5]	6	Advised Elective[4]	3
Humanities/Soc.Sci Elective[1]	3	Engineering Concentration Elective[5]	6
	15	Humanities/Soc.Sci Elective[1]	3
			15

Minimum Credit Hours Required for Graduation: 120[8]

Humanities and Social Science Electives—to be selected from the COE Guidelines and List of Approved GER courses
CSC Elective selected from CSC 114 - C++, or CSC 112 - FORTRAN
Approved Elective - one elective must be senior design oriented - see
Advised Elective - one advised elective must be and advised statistics elective selected from ST 361 or ST 370
Engineering Concentration Elective
Advanced Writing/Speech Elective - to be selected from ENG 331, ENG 333, or COM 301
Approved Elective (Senior Design) - one approved elective must have a significant senior level design component

MECHATRONICS CONCENTRATION IN ENGINEERING
Degree offered: B.S. in Engineering

This degree offers students a multi-disciplinary education in design and product development processes. The curriculum integrates the classical fields of mechanical engineering, electrical engineering, computer science and engineering, and information technology to establish basic principles for a contemporary engineering design methodology. In this methodology, engineering products and processes have moving parts that require manipulation and control of dynamic constructions to a required high degree of accuracy. Also, the design process requires enabling technologies such as sensors, actuators, software, optics, communications, electronics, structural mechanics and dynamics, and control engineering. A key factor for the design process involves integrating modern microelectronics and information technologies into mechanical and electromechanical systems. The Mechatronics concentration for the curriculum supports the "synergistic integration of precision mechanical engineering, electronics control, and systems thinking into the design of intelligent products and processes."

CURRICULUM IN ENGINEERING, Mechatronics Concentration
Degree Earned: B.S. in Engineering

FRESHMAN YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
CH 101 Chemistry - A Molecular Science	3	CSC 114 Intro. to Computing (C++)	3
CH 102 General Chemistry Lab	1	E 123 Product and Processing Engineering	2
E 100 Intro. to Engineering	0	ENG 112 Comp. & Reading	3
E 115 Intro. to Computing Environ.	1	MA 241 Calculus II	4
ENG 111 Comp. & Rhetoric	3	PY 205 Physics for Engr. and Sci. I	4
Humanities/Soc. Sci. Elective	3	Any 100-level PE in Fitness and Wellness	1
MA 141 Calculus I	4		**17**
	15		

SOPHOMORE YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
ECE 212 Fund. of Logic Design	3	CSC 210 Concepts of Programming Language	3
ECE 214 Fund. of Logic Design	1	ECE 331 Prin. of Electrical Engineering I	3
MA 242 Calculus III	4	ECE 339 Prin. of Electrical Engineering Lab	1
MAE 206 Engineering Statics	3	Humanities/Soc.Sci Elective	3
PY 208 Physics Engr. & Sci. II	4	MA 341 Applied Differential Equations	3
Physical Education Elective	1	MAE 208 Engineering Dynamics	3
	16		**16**

JUNIOR YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
ECE 218 Computing Organiz. & Micropr.	3	ECE 342 Design of Complex Digital Systems	3
ECE 314 Electronic Circuits	3	ENG 331 Comm. for Engr. & Tech.	3
Humanities/Soc.Sci Elective	3	MAE 302 Engineering Thermodynamics II	3
MAE 301 Engineering Thermodynamics I	3	MAE 315 Dynamics of Machines	3
MAE 314 Solid Mechanics	3	ST 361 Intro. to Statistics for Engr.	3
	15		**15**

SENIOR YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
ECE 444 Computer Control of Robots	3	ECE 480 Sr. Design Project in Elect. Engr.	3
ECE 460 Digital Systems Interfacing	3	MAE 316 Strength of Mechanical Comp.	3
MAE 310 Conduction and Radiation Heat Trnsfr	3	MAE 435 Prin. of Automatic Control	3
Humanities/Soc.Sci Electives	6	Humanities/Soc.Sci Electives	6
	15		**15**

Minimum Credit Hours Required for Graduation: 124

PROFESSIONAL DEGREES

The College of Engineering offers professional curricula leading to the degrees of Aerospace Engineer, Chemical Engineer, Civil Engineer, Industrial Engineer, Materials Engineer, Mechanical Engineer, or Nuclear Engineer. This program is designed for engineering students holding baccalaureate degrees who find that an additional year of education is desirable, for practicing engineers who desire to take a year of professional work to update their training, and for students holding physical sciences or mathematics degrees who seek a professional level of education in engineering. The program is intended to be sufficiently flexible to meet a wide variety of student needs, and to emphasize professional course work. The curriculum consists of a minimum of 30 hours of credit at the 400 level or above, including at least 15 hours of credit at the 500 level or above.

Applicants who hold the bachelor's degree in engineering, physical sciences, or mathematics may be admitted to the professional program of the College of Engineering upon application and presentation of official credentials. For unconditional admission, these credentials must show a minimum grade point average of 2.5 overall. Admission on a provisional basis may be granted to applicants who do not meet the formal requirements. In the case of insufficient preparation, prerequisite courses will be prescribed in addition to the normal fifth-year requirements.

Completion of the professional degree program does not qualify the recipient to sit for the Fundamentals of Engineering examination.

The following requirements of the College of Engineering will be observed:

1. Professional degree students are admitted through the Undergraduate Admissions Office as fifth-year professional degree (PR) students. They are subject to rules and regulations as established and administered by the Dean of the College of Engineering.

2. Application forms for admission to the professional degree program should be completed and submitted to the Assistant Dean for Academic Affairs at least 60 days in advance of the semester in which admission is sought. Acceptance of a student for the professional program is based on the recommendation of his department and the approval of the Assistant Dean for Academic Affairs. At the time of acceptance, NC State students may transfer a limited number of excess credits to their professional program.

3. A limited amount of credit to be applied toward the requirements for the professional degree may be transferred to NC State from recognized institutions offering advanced work in engineering and related fields. Such a transfer of credit must be approved by the department in which the students do their major work and by the Dean of the College of Engineering.

4. A graduate in one field of engineering may choose to work for a professional degree in another field provided he or she has the permission of the department. The student will be expected to take necessary prerequisite courses in addition to those required for the professional degree program.

5. Each fifth-year student will be assigned to an advisor in the sponsoring department. The function of the advisor is to assist the students in preparing a program of study and to counsel them with regard to academic work. Prior to the midterm of the first semester, the students and their advisors should agree on a program of study for the professional degree. Program of Study for Professional Degree forms will be prepared and submitted to the office of the Assistant Dean for Academic Affairs as will as to the department. Upon approval of the Office of the Dean, this becomes the student's degree program.

6. Grades for each completed course are reported to the Dean of the College of Engineering and to the Office of Registration. A minimum grade of "C" must be made in each course to obtain credit. A quality point average of 2.5 in all course work must be maintained to satisfy requirements for a professional degree.

7. All courses taken by the student after admission to the professional program will count toward the overall grade point average even though an individual course may not be a part of the degree program.

8. A student who falls below 2.5 average will be placed on probation and given one semester to raise the overall average up to a 2.5. If the student has been admitted on a provisional basis, he or she must make a 2.5 average the first semester in order to continue.

9. Work completed more than six years prior to the date on which the professional degree is to be granted may not be used as credit toward the professional degree, unless approved by the head of the department concerned and the Assistant Dean for Academic Affairs.

10. A professional degree student who has been admitted to the Graduate School may , with the approval of a Master's Degree committee and the Graduate School, transfer nine hours of credit for courses in which a grade of B or higher was received.

11. A student may transfer only once, that is, from the Professional Degree Program to the Graduate School or from the Graduate School to the Professional Degree Program. Therefore, a student is not permitted to return to either program after having transferred from that degree program.

12. It is intended that professional degree students will complete a substantial portion of credit hours toward the degree while in residence on the NC State campus.

COLLEGE OF FOREST RESOURCES

1022A Biltmore Hall
NCSU Box 8001
Raleigh, NC 27695-8001

Phone: *(919)515-6191*
Fax: *(919)515-7231*

The mission of the College of Forest Resources is to improve the use and stewardship of renewable natural resources. We seek to strengthen natural resource management, enhance environmental quality, increase productivity of forest enterprises, expand recreation and tourism opportunities and encourage sound regional economic development. To these ends, we provide superior professional education, discover new knowledge, and disseminate credible and timely information.

The success of our students is our top priority and is accomplished through an unwavering commitment to excellence from all individuals involved in the educational enterprise. The College of Forest Resources is a place where the physical, biological and social sciences intersect. The interaction of disciplines, all of which are dependent upon the natural resource base, makes the College of Forest Resources a dynamic, diverse, and exciting place to study and to work. Our goal is to provide educational programs, facilities and services for a population of students, faculty and staff that reflect the diversity in culture of our State, our Country and our World. In our College diversity is characterized in such ways as: the geographic origin, age, gender, ethnic background, the career paths of our students and the professional disciplined of our faculty. Faculty, staff, administrators and students come from the northern, southern, eastern, and western parts of the United States and from many nations including: Australia, Canada, the Czech Republic, China, Egypt, India, Iran and the Philippines.

The College of Forest Resources offers students professional and technical curricula that emphasize finding solutions to real world problems. Our College consists of students and professionals dedicated to the highest achievement in science-based global forest stewardship, research and development of forest products that raise the standard of living for all people, and recreation that enriches societies and cultures through responsible enjoyment of our natural resources. Although iterrelated, the three academic departments—Forestry; Parks, Recreation and Tourism Management; and Wood and Paper Science—draw faculty and students with very different career aspirations. The common thread is the sustainable wise use of the world's natural resources.

Over the last ten years enrollment has grown by seventy-seven percent, by far the largest of any of the established colleges at North Carolina State University. Students within the College of Forest Resources find an intellectually challenging environment and an educational community that is conducive to learning. With the increasing diversity and size of the College's population, our goal of raising the standard of living for all people becomes a realistic and inspiring goal.

DEGREE PROGRAMS

The College of Forest Resources offers programs of study leading to baccalaureate and graduate degrees in the management and use of natural resources and also offers courses in the same arena to students in other colleges. Eight professional curricula are administered in the College through its Departments of Forestry; Parks, Recreation and Tourism Management; and Wood and Paper Science, and an nineth curriculum is offered through joint administration of the Fisheries and Wildlife Sciences Program with the College of Agriculture and Life Sciences. These programs provide a broad education in the biological, physical, and social sciences as well as a sound cultural and professional background. Baccalaureate degrees prepare students for careers in the fields of fisheries and wildlife sciences; forest management; natural resources assessment and management; parks, recreation and tourism management; pulp and paper science and technology; watershed hydrology and wood products.

Graduate degrees offered include Master of Science, Master of Forestry, Master of Natural Resources Administration, Master of Parks, Recreation and Tourism Management, Master of Wood and Paper Science, and the Doctor of Philosophy. Graduate degree programs may be tailored to a variety of specialized and interdisciplinary topics related to the teaching and research activities of the College. Applicants should consult the *Graduate Catalog* for additional information about these programs.

STUDENT ACTIVITIES

Each department in the College has a student curriculum club and/or student chapter of the appropriate national professional organization. All of these organizations provide opportunities for professional development, for interaction with faculty and other students, and for participation in local, regional, and national student and professional activities. Student representatives from each organization and curriculum serve on the College of Forest Resources Council. The Council provides overall coordination for student activities, allocates funds for student activities, and oversees production of the *Pinetum*, the College of Forest Resources student yearbook.

FACILITIES AND LABORATORIES

In addition to standard classrooms and teaching laboratories, the College of Forest Resources has a unique complex of indoor and field facilities that are utilized in the academic programs. Computer facilities include a general microcomputer lab, two labs with microcomputers and workstations for applications in geographic information systems and remote sensing, and network access to the university mainframe computer. Also available are several different analytical and biotechnology facilities, a photo interpretation lab, an extensive herbarium, and a wood sample collection. Facilities for field instruction and projects include 80,000 acres in forest: the Hofmann Forest on the Coastal Plain; the Hill, Schenck, Hope Valley and Goodwin Forests in the Piedmont; and the Slocum summer camp at the Hill Forest in Durham county. Specialized laboratories unique to wood products programs are contained in the Hodges Wood Products Laboratory and the Reuben B. Robertson Pulp and Paper Laboratory. Equipment in the Hodges Laboratory includes computer-controlled woodworking machinery, dry kilns, veneer lathe and numerous other items required to convert wood into products. The Robertson Laboratory is a 50,000 sq. ft. facility which contains laboratories and modern pulping and papermaking equipment dedicated to teaching and research activities. Examples of equipment are secondary fiber recycling equipment, a thermo mechanical pulping unit, paper machine, process control equipment, paper testing laboratory, and pulping digesters.

FIELD INSTRUCTION AND WORK EXPERIENCE

All curricula in the College have strong components of hands-on field and laboratory instruction and experience, and all either require or strongly recommend voluntary on-the-job work experience. All students (except those in natural resources) are required to complete the equivalent of one or more of the following summer activities: camp, internship, practicum, work experience. The forest management and fisheries and wildlife curricula both have required summer camps. Undergraduates enrolled in parks, recreation and tourism management complete a nine-week internship immediately following the completion of the junior year. All pulp and paper majors spend at least one summer working in an industrial setting designated by the College. Wood

products students attend a summer practicum following the freshman year. Students in all curricula may also participate in summer jobs and the cooperative education program to gain work experience.

Local field trips are a regular part of many courses. Additional field instruction and scheduled trips to representative industries and agencies are frequently required as a part of regular class assignments.

HONORS AND SCHOLARS PROGRAMS

The College of Forest Resources participates in the University Scholars Program in which exceptional new students (freshman or transfer) are selected for special courses and activities that provide an expanded educational experience.

The purpose of the College of Forest Resources' Honors Program is to offer the opportunity for advanced students with outstanding records to enhance the depth of study in their major field. Students with an overall GPA of 3.000 or better and a major GPA of 3.250 or better are invited to participate in the Honors Program. Students must have at least 40 hours of credit. Honors students develop more rigorous programs of study, frequently taking advanced courses in mathematics, science, or social science or graduate courses in the chosen curriculum. With the adviser's consent honors students may substitute preferred courses for normally required courses in order to develop strength in special interest areas. Honors students are required to undertake a program of independent study which can involve a research problem or special project during their junior or senior year, and they must participate in the senior honors seminar.

Two honor societies in the College of Forest Resources promote and recognize academic excellence: Xi Sigma Pi (for all majors within the college) and Rho Phi Lambda (for recreation majors). Advanced undergraduate and graduate students with high academic achievement are invited to become members of these societies. High achieving forest management and natural resources students are also eligible for recognition by two agriculture honor societies, Alpha Zeta and Gamma Sigma Delta. All students are also eligible for recognition by the campus-wide honor societies.

GIFFORD PINCHOT SCHOLARS PROGRAM

The Gifford Pinchot Scholars Program, a joint program with the College of Humanities and Social Sciences, follows the model established by the Jefferson, Franklin and Whitney Programs. Academically talented students are invited to pursue simultaneously a B.S. degree in Forest Management through the College of Forest Resources and a B.A. degree in a major in Humanities and Social Sciences through the College of Humanities and Social Sciences. The Pinchot Scholars Program is limited to a small number (10 or fewer per year) of highly qualified and motivated students. Scholarship support is available to some participants in the Pinchot Scholars Program.

Pinchot Scholars follow the requirements for the B.S. in Forest Management (with one exception: the physics course PY 211is not required). For the B.A. degree, they follow a 30-hour major concentration in multidisciplinary studies. Included in this major are two core requirements: MDS 340 Perspectives in Agricultural History (3 credits) and MDS 498 Senior Thesis (3 credits). Participants also complete an additional MDS seminar (1 credit). In addition, Pinchot Scholars complete all the general education requirements for a B.A. degree in the College of Humanities and Social Sciences. A total of 155 credit hours is required for the double degree which students can complete in four and a half years.

The multidisciplinary studies major will involve placing forest management in the context of cross-cultural perspectives, global issues, and public policy. The exact set of courses that will constitute the major will be determined by students in consultation with their advisory group, subject to the approval of the Multidisciplinary Studies Committee. Each student is assigned an advisory group consisting of an academic advisor from each college, plus a mentor from the forest industry. Pinchot Scholars also participate in existing cooperative activities with other double-degree program scholars. For more information, contact the Associate Dean for Academic Affairs, College of Forest Resources, 1022-N Biltmore, Box 8001 or the Assistant Dean for Undergraduate Academic Affairs, College of Humanities and Social Sciences, 201-M Winston, Box 8101.

SCHOLARSHIPS

The College of Forest Resources administers a large program of academic scholarships that is separate from the University Merit Awards Program. Academic scholarships (ranging from $1,000 to $4,050 per year) and renewable annually are awarded in several program areas to entering freshmen and transfer students. The appropriate departments accept applications, and based on academic excellence and leadership award the scholarships that are administered through the North Carolina Forestry Foundation and the Pulp and Paper Foundation. The awards include a total of more than 170 scholarships for students in the forest management; natural resources; parks, recreation and tourism management, pulp and paper science and technology; and wood products and technology curricula.

COMPUTER COMPETENCY

Extensive use of microcomputers and workstations is incorporated throughout all curricula of the College of Forest Resources. Each program begins with a basic course in computer competency in the freshman year, and students are expected to use the computer for increasingly complex class assignments and for the preparation of papers and reports. Computing resources are available for student use in the College and elsewhere on campus, but many students find it advantageous in terms of convenience to purchase a personal computer. Questions about such a purchase should be directed to the Associate Dean for Academic Affairs or the appropriate departmental curriculum coordinator.

INTERNATIONAL ACTIVITIES

Students in the College of Forest Resources are exposed to the international dimensions of their programs in a variety of ways. Many faculty members regularly travel abroad and a number are active in major projects in foreign countries, including an international cooperative research project concentrating on Central America and Mexico and a faculty exchange program with Sweden. With that faculty experience, the international aspects of many topics are covered in core courses, and several elective undergraduate and graduate courses focus specifically on the international dimensions of natural resource management. In addition, many international students enroll in the College, with as many as 21 different countries represented in recent years.

DEPARTMENT OF FORESTRY

Biltmore Hall, Room 2018
Phone: (919) 515-2891

F. W. Cubbage, *Head*
A. E. Hassan, *Director of Undergraduate Programs*
B. A. Bergmann, *Director of Graduate Programs*

Distinguished University Professor: E.B. Cowling; *Alumni Distinguished Undergraduate Professors:* C.B. Blank, R.R. Braham, R.A. Lancia; *Carl Alwin Schenck Professor:* H.L. Allen; *Edwin F. Conger Distinguished Professor:* R.R. Sederoff; *Professors:* H.L. Allen, R.I. Bruck, A.W. Cooper, E.B. Cowling,

F.W. Cubbage, P.D. Doerr, W.S. Dvorak, E.C. Franklin, D.J. Frederick, L.F. Grand, J.D. Gregory, A.E. Hassan, D.L. Holley, J.B. Jett, E.J. Jones, S. Khorram, R.A. Lancia, R. Lea, J.R. McGraw, S.E. McKeand, C. McKinley, R.L. Noble, R.R. Sederoff, L.T. Tombaugh;*Professors Emeriti:* C.B. Davey, R.C. Kellison, B.J. Zobel; *Associate Professors:* R.C. Abt, H.V. Amerson, G.B. Blank, R.R. Braham, J.A.Collazo, L.J. Frampton, B. Goldfarb, L.G. Jervis, J.P. Roise, A.M. Stomp, R.J. Weir, R.W. Whetten; *Research Associate Professors:* B.A. Bergmann, G.R. Hodge, B. Li, B. Liu, D.M. O'Malley, T.H. Shear; *Visiting Research Associate Professor:* F.C. Zinkhan; *Assistant Professors:* R.E. Bardon, J.L. bettis, H.M. Cheshire, G.R. Hess, S. McNulty (USDA), D.J. Robinson, E.O. Sills, W.D. Smith (USDA); *Research Assistant Professors:* S. Chang, D. Kelting, J. Siry, G. Sun; *Visiting Research Assistant Professors:* A. Johnson, E.S. Goldgeier; *Associate Members of the Faculty:* P.T. Bromley, W.J. Fleming, R.A. Powell, T.R. Simons (Zoology), H.A. Devine, L. Gustke, R. Moore, B.E. Wilson (Parks, Recreation and Tourism Management), F.B. Hain (Entomology), L.E. Hinesley (Horticultural Science), D.E. Moreland (USDA-Crop Science), E.A. Wheeler (Wood and Paper Science), S.T. Warren (Multidisciplinary Studies).

The undergraduate program of the Department of Forestry prepares students for professional challenges, personal growth, and a lifetime of service as managers of renewable natural resources. The curricula endeavor to produce well-educated forestry and natural resources graduates who have the basic knowledge, skills, flexibility, and attitude needed for successful professional performance in a wide variety of career opportunities. Graduates will be prepared to face the challenges of competing uses of natural resources and the environment, and the pressures for increasing production of goods and services from natural ecosystems while maintaining their quality for future generations.

Department of Forestry strives to enroll and graduate a high quality, culturally and racially diverse student body to enhance the diversity and richness of forestry and natural resources professionals. Its academic curricula are enriched by out-of-class contacts among students, faculty, and practicing professionals, which promote a sense of professionalism and professional community. Gaining practical experience is encouraged through participation in summer employment and the cooperative education program.

The department has five Bachelor of Science programs: Forest Management, Natural Resources Ecosystem Assessment, Natural Resources-Policy and Administration, Fisheries and Wildlife Sciences, and Environmental Sciences-Watershed Hydrology. The Forest Management curriculum provides the broad-based forestry education needed for direct employment into positions in a wide variety of forestry or forestry-related organizations. The Fisheries and Wildlife Sciences curriculum provides specializations needed by agencies and industries. The Natural Resources curricula provide more generalized, interdisciplinary programs in natural resources management that focus on the area indicated in the curriculum titles. The curriculum in Environmental Sciences Watershed Hydrology focuses on the specialized area of hydrologic science and watershed management.

Instruction and practice in communications skills (both writing and speaking) are integrated into the required forestry (FOR) courses throughout the Forest Management curriculum and to a lesser extent in the forestry (FOR) and natural resources (NO) courses of the Natural Resources curriculum and in several of the professional courses of the Environmental Sciences Watershed Hydrology curriculum. The communications-across-the-curriculum program produces graduates who are highly competent and confident in the communication skills needed by successful natural resource managers and environmental sciences professionals.

The use of computers is integrated into all five of the curricula in a similar fashion. Introductory instruction in the use of computers is provided in the freshman year, and practical assignments on the use of computers as a tool in natural resource management are integrated into the advanced courses of all three curricula. The curriculum in Environmental Sciences Watershed Hydrology, in particular, has a very heavy emphasis on computer applications (including programming) throughout the general math and science courses as well as the advanced professional courses.

Information on department programs may be obtained by contacting Ms. Kris Martin, College of Forest Resources Recruiting Coordinator, NCSU, Box 8001, Raleigh, NC 27695-8001, phone (919) 515-5510 or Dr. Awatif E. Hassan, Assistant Head for Undergraduate Programs, Department of Forestry, NCSU, Box 8002, Raleigh, NC 27695-8002, phone (919) 515-7577.

SCHOLARSHIPS

The Department of Forestry annually awards four types of scholarships that are available to freshmen, transfers, and advanced students: Academic, Forestry Summer Camp, Industrial and Work-Study. About 35 Academic Scholarships varying between $2000 and $3000 are awarded annually in April for the following academic year and are renewable provided that superior progress is made toward a degree. Six endowments provide these awards: John M. and Sally Blalock Beard, Edwin F. Conger, Hofmann Forest, James L. Goodwin, Jonathan Wainhouse Memorial, and R.B. and Irene Jordan.

Six scholarships are available each year to students attending Forestry Summer Camp. Four scholarships are awarded in April to students attending the next camp and two are awarded after camp to the students who exhibited superior academic and professional skills while at camp. Three endowments provide these awards: Ralph C. Bryant, Maki-Gemmer-Johnson, and Victor W. Herlevich. Three summer camp scholarships are available to Fisheries and Wildlife students through the Leopold Wildlife Club.

Four Industrial Scholarships are available each year. In addition to cash awards of $2000, the Industrial Scholarships provide practical work experience with industrial forestry organizations. Industrial Scholarships are supported by grants from Canal Wood Corp., Chesapeake Corp., Georgia Pacific Corp., and Squires Timber Company.

Approximately 15 Work-Study Scholarships are awarded each year, generally to juniors and seniors. Work-Study Scholarships, currently at $2100 each, carry a work requirement which is usually satisfied by assisting with operational activities on the college forests. This requirement means that recipients must be advanced students with some field skills. Four endowments provide these awards: Biltmore Forest, James L. Goodwin, George K. Slocum, and Dan K. Spears.

Scholarship applications or questions should be directed to Dr. Richard Braham, Forestry Scholarship Coordinator, phone (919) 515-7568, fax (919) 515-8149, e-mail: Braham@cfr.cfr.ncsu.edu.

COOPERATIVE EDUCATION AND SUMMER WORK EXPERIENCE

Practical work experience is an important component of the professional degree programs in the Department of Forestry. Experience may be gained through participation in the Cooperative Education Program or through summer work. The department has close ties with a number of employers in the field of forestry and natural resources and provides placement assistance for the work experience programs. The Cooperative Education Program, which requires a minimum 2.250 GPA after at least one year of study for participation (many employers require a higher minimum), involves alternating semesters or summer periods on the job with semesters on campus for classes. A total of 12 months of work experience is required. Students who successfully complete the "co-op" program are in high demand by employers. Interested students should contact the department placement officer, Mr. Larry Jervis, phone (919) 515-7576, fax (919) 515-8149, e-mail: Jervis@cfr.cfr.ncsu.edu.

DUAL DEGREE PROGRAMS

Students enrolled in one of the department's degree programs who have a strong interest in another degree topic may obtain a second baccalaureate degree in

addition to the primary one. Such dual degree programs may be designed to provide a broader base in a related technical field such as wood science and technology or soil science or to broaden the student's knowledge and skills in a supporting field such as business, economics, sociology, or political science. Joint programs require coordination of the courses required in both curricula and the additional time required to complete them depends on the similarity between the curricula and the use of electives in one to satisfy required courses in the other. One to several extra semesters may be required to complete two degrees but expanded employment opportunities are a definite benefit.

TRANSFER STUDENTS

The Department of Forestry accepts NC State students with a minimum 2.0 GPA and students from other accredited colleges and universities with good academic records (minimum 2.5 GPA on a 4.0 scale preferred) as transfers into the Forest Management and Natural Resources curricula. Minimum GPAs of 2.3 and 3.0 respectively are required to transfer into the Fisheries and Wild Life Sciences, Environmental Sciences Watershed Hydrology curriculum. Students at community colleges, junior colleges, or other baccalaureate institutions who plan to transfer to one of the department's degree programs should closely follow the desired curriculum by taking the equivalent courses available. Only equivalent courses will be credited to the appropriate degree program after enrolling at NC State, and the time required to complete the degree will depend on the courses remaining in the degree track. Students applying for the Forest Management curriculum must have at least 30 credits equivalent to those in the freshman and sophomore years and must transfer here in the fall of the sophomore year in order to complete the courses required for summer camp. Formal articulation agreements exist with the four forestry programs at North Carolina community colleges and those students do not need to attend Summer Camp. Questions about transfer procedures or courses should be directed to Dr. A. E. Hassan, Assistant Department Head for Undergraduate Programs, phone (919) 515-7577, e-mail: Hassan@cfr.cfr.ncsu.edu.

CURRICULUM IN FOREST MANAGEMENT

The curriculum in Forest Management is a professional program accredited by the Society of American Foresters that has long been ranked as one of the best among the 50+ such programs in the country. With a rigorous math and science base, the curriculum produces graduates with a broad education in the natural sciences, humanities and social sciences, communications skills, computer competency, and the technical knowledge and skills needed for sound management of the multiple resources of natural and managed forest ecosystems. Preparatory courses in the freshman and sophomore years are followed by the 10-week forestry summer camp where the woods knowledge and field skills that are essential for all foresters are acquired. Core courses of the junior and senior years focus on forest ecosystem processes, applied economics, operational practices in forest stand management, measurement and analysis of forest stand components, policy issues in natural resource management and the management decision-making tools and skills needed to develop and implement forest management plans.

OPPORTUNITIES

Graduates in Forest Management are in demand by state and federal land-managing agencies, by industrial concerns growing wood as raw material, by state forestry and agriculture extension services, by forestry-related organizations such as nurseries and landscape management firms, and by urban natural resource management agencies. Some graduates, after acquiring professional forestry experience, are self-employed as consultants and as operators or owners of forestry-related businesses. Several recent graduates have become high school teachers, some have joined the Peace Corps, some are working in forestry-related sales and marketing and in financial management and others have joined environmental consulting firms. Many, of course, go on to graduate school to specialize in a wide variety of forestry and related programs. Employment opportunities are with the forest products industry, natural resource agencies, consulting firms, and environmental organizations.

CURRICULUM IN FOREST MANAGEMENT
Degree earned: B.S. in Forest Management

FRESHMAN YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
BIO 125 General Biology	4	CH 101 Chemistry - A Molecular Science	3
CFR 134 Computers in Natural Resources	1	CH 102 General Chemistry Lab	1
ENG 111 Comp. & Rhetoric	3	ENG 112 Comp. & Reading	3
FOR 110 Intro. to Forestry	2	MA 114 Intro. to Finite Math. with Applic.	3
MA 121 Elements of Calculus[1]	3	History/Literature Elective[2]	3
PE 1__ Fitness & Wellness elective	1	Physical Education Elective	1
	14		**14**

SOPHOMORE YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
CH 201/202 Chemistry-A Quant. Sci. & Lab or		ARE 201 Intro. to Agric. & Res. Econ. or	
CH 220 Intro to Organic Chemistry	4	EC 205 Fund of Economics	3
FOR 212 Dendrology	4	BO 360 Intro. to Ecology	3
PY 211 College Physics I	4	History/Literature Elective	3
WPS(FOR) 202 Wood Anatomy & Prop.	3	SSC 200 Soil Science	4
	15		**13**

SUMMER CAMP[3]

FOR 204 Silviculture	2
FOR 261 Forest Communities	2
FOR 264 Forest Wildlife	1
FOR 265 Fire Management	1
FOR 274 Mapping & Mensuration	4
	10

JUNIOR YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
FOR 303 Silvics & Forest Tree Physiology	3	FOR 304 Theory of Silviculture	4
FOR 319 Forestry Economics	3	FOR 374 Forest Meas., Modeling & Invent.	3
FOR 353 Air Photo Interp. & Photogram	3	ENT (FOR) 402 Forest Entomology	3
Humanities/Soc. Sci. Elective	3	FOR 434 Forest Operations & Analysis	4
ST 311 Intro. to Statistics	3	PP(FOR) 318 Forest Pathology	3
	15		**17**

SENIOR YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
FOR 405 Forest Mgmt.	4	FOR 406 Forest Invent. Analysis & Plan	4
FOR 472 Renew. Res. Policy & Mgmt.	3	Advised Elective[4]	3
FOR 490 Senior Seminar in Forestry	1	FOR (FW) 404 Forest Wildlife Mgmt.	3
Social Science Elective	3	Advised Technical Elective	3
Advised Elective[4]	3	Phil.,Relig.,Vis/Perf. Arts Elective	3
	14		**16**

Minimum Hours Required for Graduation: 128

[1]Students with appropriate math skills are encouraged to take the math sequence MA 131-231 or MA 141-241. Credit earned in MA 107, MA 108, or MA 111 does not apply toward the 128 minimum credit hours required for graduation.

[2]21 credit hours of humanities/social science electives, distributed as shown below, must be selected from the university lists in the department curriculum handbook.

1. History or literature - 6 credit hours in any combination of history or literature courses
2. Philosophy, religion, or visual or performing arts - 3 credit hours.
3. Social Science (anthropology, cultural geography, economics, politics and government, psychology, or sociology) - ARE 201 plus three (3) credit hours of elective.
4. Science, technology, and society (humanities and social science perspective) - 3 credit hours.
5. Humanities/social science - 3 additional credit hours from any of the above categories or from the humanities/social science (additional) list.

[3]To be eligible for Summer Camp, the student must have passed all freshman and sophomore courses (including a minimum grade of C in ENG 111 & 112) with a minimum cumulative GPA of 2.00.

[4]Six credit hours of Advised Electives must be selected from the following courses: FOR 401, FOR 411, FOR 422, FOR 423, FOR 484 and FOR 491.

[5]Three credit hours of an Advised Technical Elective course to be selected from any department with the advisor's approval.

Notes:

1. *Students enrolled in the Forest Management curriculum must follow the curriculum and make reasonable progress toward the degree.*
2. *Additional graduation requirements:*
   a. *each student must achieve a Major Grade Point Average (MGPA) of 2.00 or better in order to graduate in addition to other University requirements including a minimum grade of C in ENG 111 and 112.*
   b. *Achieve foreign language proficiency at the FL_ 102 level.*
   c. *Complete at least one course that focuses on a non-English speaking culture that is selected from the university list in the department curriculum handbook. The selected course may also satisfy a humanities/social sciences requirement.*
   d. *Complete a minimum of 4 workshops in the Leadership Development Series selected from the list in the department curriculum handbook. Two workshops are a required part of FOR 110 and two are a required part of FOR 406.*

FORESTRY SUMMER CAMP

An intensive, full-time, 10-week summer camp experience, with forestry field training in the Coastal Plain, Piedmont, and Mountain regions of North Carolina, is required in the Forest Management curriculum. The camp is based at the College's Hill Demonstration Forest with trips taken to other regions. Students take the summer camp after completion of the sophomore year and earn 10 semester credits for courses that provide a base of knowledge and skills for the advanced courses to come.

MINOR IN FOREST MANANGEMENT

The Forest Management minor is open to all undergraduate degree students at NC State who are interested in learning the basics of the structure and functioning of forest ecosystems and the policies and practices of forest management. The minor will be useful to students in unrelated career fields who wish to have a better understanding of the scientific and policy issues involved in the sound stewardship of the nation's forests. The minor will be useful to students in related career fields who may be responsible for management of natural resources or interacting with foresters.

The minor in Forest Management requires a minimum of 18 credit hours that includes two required courses, FOR 212 Dendrology and FOR 472 Renewable Resource Policy and Management, and 11 credits of elective courses. Students who wish instruction and field experience in forestry technical skills may choose to attend Forestry Summer Camp. For additional information, contact Dr. Awatif E. Hassan, Assistant Department Head for Undergraduate Programs (phone 919-515-7577).

CURRICULA IN NATURAL RESOURCES

The two natural resources curricula offered by the Department of Forestry are components of the campus-wide baccalaureate degree program in Natural Resources. The curricula are designed to produce natural resources professionals with a broad interdisciplinary background coupled with a specific focus in natural resources management. The Natural Resources curricula are rigorous math and science-based programs with a common core of math, science, communications, and humanities and social science courses that provide a broad general education. Students in all Natural Resources curricula will begin the program in a common introductory course, NR 100, and complete the program in a common junior course, NR 300, that focuses on natural resource measurements and a senior course, NR 400, that focuses on the tools and skills of natural resource management problem solving and decision making. Those common courses will highlight the integrated nature of a broad field and provide experience in the important professional practice of working together in interdisciplinary teams.

The curriculum in Natural Resources Ecosystem Assessment will produce graduates who have the knowledge and skills needed to inventory and describe the characteristics of natural ecosystems and evaluate the impacts of management practices. Ecosystem assessment or environmental impact assessment is an

extremely important and somewhat specialized arena in the environmental field that requires individuals who understand ecosystem structure and processes; who can identify, measure, inventory, and describe ecosystems; and who can apply standard evaluation and classification systems such as wildlife habitat evaluation procedures and the federal wetland delineation criteria. To the strong science base of the core is added a concentration that provides advanced courses in sampling and measurement and in vegetation, soils, hydrology, and wildlife and fisheries. Many of the 400-level courses also address techniques and issues of natural resource management.

The curriculum in Natural Resources Policy and Administration will produce graduates who have the knowledge and skills to manage natural resources programs in a variety of settings and organizations with an emphasis on public agencies. The advanced courses of the curriculum provide a broad background in economics, policy, government, public administration, and natural resources management. An economics track begins with introductory microeconomics and culminates with environmental economics and public finance. Courses in the various levels of government and public administration provide in-depth knowledge of how public institutions work. Courses in forestry, wildlife and fisheries, and outdoor recreation provide background on issues and techniques of managing natural ecosystems for various uses. A common thread of how public policy on natural resources is influenced and developed runs through many of the courses already noted and culminates in two senior courses that focus on policy.

OPPORTUNITIES

Graduates with the kind of knowledge and expertise provided by the Natural Resources Ecosystem Assessment curriculum are needed in a variety of public agencies and private organizations that are involved in environmental regulation and management. Examples are the wetlands protection programs of the US Environmental Protection Agency and the US Army Corps of Engineers and the various environmental regulatory programs of state and local governments. Private environmental consulting firms need entry-level professionals with broad skills in the field of environmental assessment. The broad natural resources background provided by this curriculum also provides a strong base for students who wish to go on to graduate school or environmental law or build additional specialties focused on specific job opportunities or career tracks.

The curriculum in Natural Resources Policy and Administration is designed to produce administrators and managers for public agencies and private organizations that are involved with management, administration, policy making, preservation, or regulation of natural resources. Examples are the USDI National Park Service, the US Environmental Protection Agency, the US Geological Survey, state and local government agencies and not-for-profit environmental organizations. The broad background in government, economics, policy, and natural resource management also provides a strong base for students who wish to pursue a graduate program in the natural resources economics and policy arena.

CURRICULUM IN NATURAL RESOURCES, ECOSYSTEM ASSESSMENT
Degree earned: B.S. in Natural Resources

FRESHMAN YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
BIO 125 General Biology	4	CH 101 Chemistry- A Molecular Science	3
CFR 134 Computers in Natural Resources	1	CH 102 General Chemistry Lab	1
ENG 111 Comp. & Rhetoric	3	COM 110 Public Speaking **or**	
MA 131 Calculus for Life & Mgmt. Sci A [1]	3	COM 112 Interpersonal Comm.	3
NR 100 Intro. to Natural Resources	2	ENG 112 Comp. & Reading	3
Any 100-level PE in Fitness & Wellness[2]	1	FOR 252 Intro. to Forest Science	3
	14	MA 231 Calculus for Life & Mgmt. Sci B	3
			16

SOPHOMORE YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
CH 201 Chemistry - A Quantitative Sci. **and**	3	MEA 101 Geology I:Physical	3
CH 202 Quantitative Chemistry Lab **or**	1	MEA 110 Geology I Lab	1
CH 220 Into. Organic Chemistry		PS 201 Intro. to American Govt. **or**	
ARE 201 Intro. to Agric. & Res. Economics **or**		PS 202 State & Local Govt.	3
EC 205 Intro. to Economics I	3	History/Literature Elective	3
FOR 212 Dendrology	4	SSC 200 Soil Science	4
PY 211 College Physics I	4	PE 253 Orienteering	1
	15		**15**

JUNIOR YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
BO 360 Intro. to Ecology	3	ARE(EC) 336 Intro. Res. & Environ. Econ.	3
BO 365 Ecology Lab	1	ENG 333 Comm., for Sci. & Researchers	3
FOR 353 Air Photo Interpret. & Photogram	3	NR 300 Natural Res. Measurements	4
ST 311 Intro. to Statistics	3	ZO 460 Aquatic Natural History Lab	2
ZO 201 General Zoology	4	FOR (FW) 404 Forest Wildlife Mgmt.	3
History/Literature Elective[3]	3		**15**
	17		

SENIOR YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
BO 495F Wetland Plants	3	Advised Elective	3
FOR 401 Watershed & Wetlands Hydrology	4	FW 485 Natural Res. Advocacy	3
FOR 584 Pract. of Environ. Impact Asses.	4	NR 400 Natural Res. Mgmt.	4
FW(ZO) 420 Fishery Science	3	SSC 452 Soil Classification	4
Phil., Relig. Vis/Perf. Arts Elective	3	Social Science Elective	3
	17		**17**

Minimum Hours Required for Graduation: 126

[1] Students with appropriate skills are encouraged to take the math sequence MA 141-241. Credit earned in MA 107, MA 108, or MA 111 does not apply toward the 126 minimum credit hours required for graduation.
[2] Two semesters of physical education are required for graduation. At least one course must fulfill the "Fitness and Wellness" requirement (any PE course at the 100 level in fitness and wellness).Students may elect S/U grading for all PE courses.
[3] 12 credit hours of H/SS electives, distributed as shown below, must be selected from the university lists in the department curriculum handbook.

1. History or literature - 6 credit hours in any combination of history or literature courses.
2. Philosophy, religion, or visual or performing arts - 3 credit hours.
3. Social Science (anthropology, cultural geography, economics, politics and government, psychology, or sociology) - 3 credit hours of elective.

Notes:
1. Students enrolled in the Natural Resources, Ecosystem Assessment curriculum must follow the curriculum and make reasonable progress toward the degree.
2. Additional graduation requirements:
   a. Earn a minimum grade of C in ENG 111 & 112.
   b. Achieve foreign language proficiency at the FL_ 102 level.
   c. Complete at least one course that focuses on a non-English speaking culture that is selected from the university list in the department curriculum handbook. The selected course may also satisfy humanities/social sciences requirement.

CURRICULUM IN NATURAL RESOURCES, POLICY AND ADMINISTRATION
Degree earned: B.S. in Natural Resources

FRESHMAN YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
BIO 125 General Biology	4	CH 101 Chemistry - A Molecular Science	3
CFR 134 Computers In Natural Resources	1	CH 102 General Chemistry Lab	1
ENG 111 Comp. & Rhetoric	3	COM 110 Public Speaking *or*	
MA 131 Calculus for Life & Mgmt. Sci. A[1]	3	COM 112 Interpersonal Comm.	3
NR 100 Intro. to Natural Resources	2	ENG 112 Comp. & Reading	3
Any 100-level PE in Fitness & Wellness	1	FOR 252 Intro. to Forest Science	3
	14	MA 231 Calculus for Life & Mgmt. Sci. B	3
			16

SOPHOMORE YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
CH 201 Chemistry - A Quantitative Science	3	PS 201 Intro. to American Govt.	3
CH 202 Quantitative Chemistry Lab **OR**	1	SSC 200 Soil Science	4
CH 220 Intro Organic Chemistry ***OR***		ST 311 Intro. to Statistics	3
ARE 201 Intro. to Agric. & Res. Economics *or*		PE 253 Orienteering	1
EC 205 Fundamentals of Economics	3	ZO 150 Animal Diversity	4
MEA 101 Geology I: Physical	3		**15**
MEA 110 Geology I Lab	1		
PY 211 College Physics	4		
	15		

JUNIOR YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
ARE(EC) 301 Intermediate Microeconomics	3	ARE(EC) 336 Intro. Res. & Environ. Econ.	3
BO 360 Intro. to Ecology	3	ENG 333 Comm. for Sci. & Researchers	3
BO 365 Ecology Lab	1	NR 300 Natural Res. Measurements	4
FOR 353 Air Photo Interpret. & Photogram	3	PS 202 State & Local Govt.	3
PRT 350 Outdoor Recreation Mgmt.	3	History/Literature Elective	3
History/Literature Elective	3		**16**
	16		

SENIOR YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
EC 410 Public Finance	3	ARE(EC) 436 Environ. Economics	3
FOR 472 Renew. Res. Policy & Mgmt.	3	FW(AC) 485 Natural Res. Advocacy	3
FW(ZO) 353 Wildlife Mgmt. or		NR 400 Natural Res. Mgmt.	4
FW(ZO) 420 Fishery Science	3	PRT 451 Prin. Recr. Plan. Facil. Dev.	3
PS 312 Intro. to Public Admins.	3	Social Science Elective	3
Philosophy, Religion, Visual/Performing Arts Elective	3		**16**
	15		

Minimum Hours Required for Graduation: 123

[1]Students with appropriate math skills are encouraged to take the math sequence MA 141-241. Credit earned in MA 107, MA 108, or MA 111 does not apply toward the 123 minimum credit hours required for graduation.
[2]Two semesters of physical education are required for graduation. At least one course must fulfill the "Fitness and Wellness" requirement (any PE course in Fitness and Wellness at the 100 level). Students may elect S/U grading for all PE courses.
[3]12 credit hours of Humanities/Social Science electives, distributed as shown below, must be selected from the university lists in the department curriculum handbook.

1. History or literature - 6 credit hours in any combination of history or literature courses.
2. Philosophy, religion, or visual or performing arts - 3 credit hours.
3. Social Science (anthropology, cultural geography, economics, politics and government, psychology, or sociology) - 3 credit hours of elective.

Notes:

1. Students enrolled in the Natural Resources, Policy and Administration curriculum must follow the curriculum and make reasonable progress toward the degree.

2. Additional graduation requirements:

a. Earn a minimum grade of C in ENG 111 & 112.

b. Achieve foreign language proficiency at the FL 102 level.

c. Complete at least one course that focuses on a non-English speaking culture that is selected from the university list in the department curriculum handbook. The selected course may also satisfy humanities/social sciences requirements.

CURRICULUM IN ENVIRONMENTAL SCIENCES

Hydrology is the science of water that is concerned with the origin, circulation, distribution, and properties of the waters of the earth. Watershed hydrology then is the application of that science to the study of the storage, movement, and quality of water in the context of the natural landscape unit, the watershed, and the effects of man's activities on that water. The curriculum in Environmental Sciences, Watershed Hydrology will produce graduates who have the knowledge and skills needed to analyze the hydrologic functioning of watersheds, to plan and implement watershed management practices, and to deal with the ecologic, social, political, and economic aspects of water resources problems. The Environmental Sciences core provides a strong education in the basic physical, biological, and mathematical sciences; the humanities and social sciences; and the structure and functions of natural ecosystems. Advanced courses of the concentration in Watershed Hydrology focus on hydrologic processes in watersheds; applications of hydrology in environmental management; skills of measurement, analysis, and communication; and computer applications. For information on entrance requirements for freshmen and transfer students, contact the curriculum coordinator: Dr. James D. Gregory, Department of Forestry, NCSU, Box 8008, Raleigh, NC 27695-8008, phone (919) 515-7567, fax (919) 515-6193, e-mail: jim_gregory@ncsu.edu.

OPPORTUNITIES

The increasing stresses on water resources resulting from population growth will maintain demand for hydrologists in a variety of career positions. Hydrologists are needed in research, technical, environmental assessment and management positions in a variety of federal and state agencies and private organizations. The Environmental Sciences, Watershed Hydrology curriculum meets the criteria of the US Office of Personnel Management for the position of Hydrologist; therefore, graduates will be qualified to serve as hydrologists in federal agencies such as the US Geological Survey, US Forest Service, US Army Corps of Engineers, and the USDA Soil Conservation Service. State agencies such as the Office of Water Resources and the Division of Environmental Management are also excellent sources of employment. In the private sector, hydrologists are needed by environmental consulting firms and environmental organizations and by companies that own and manage large areas of forested, agricultural, or urbanized land. The rigorous scientific and quantitative background in the field of hydrology in this curriculum also provides excellent preparation for students who wish to pursue a graduate program in water resources.

CURRICULUM IN ENVIRONMENTAL SCIENCES, WATERSHED HYDROLOGY

Degree earned: B.S. in Environmental Sciences

FRESHMAN YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
BIO 125 General Biology	4	CH 201 Chemistry - A Quantitative Science	3
CH 101 Chemistry - A Molecular Science	3	CH 202 Quantitative Chemistry Lab	1
CH 102 General Chemistry Lab	1	ENG 112 Comp. & Reading	3
ENG 111 Comp. & Rhetoric	3	E 115 Intro. to Computing Environments	1
MA 141 Analytic Geom & Calculus I	4	ES 100 Intro. to Environ. Sciences	3
	15	MA 241 Analytic Geom. & Calculus II	4
		Any 100- level PE in Fitness & Wellness[2]	1
			16

SOPHOMORE YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
PY 205 Physicsl for Engr. & Sci. I	4	ARE 201 Intro. to Agric. & Res. Economics *or*	
CSC 112 Intro. to Computing - FORTRAN	3	EC 201 Intro. to Economics I	3
MA 242 Analytic Geom. & Calculus III	4	CE 214 Engineering Mechanics - Statics	3
MEA 130 Intro. to Weather & Climate	3	MA 341 Applied Diff. Equations I	3
MEA 135 Intro. to Weather & Climate Lab	1	PY 208 Physics for Engr. & Sci. II	4
Physical Education Elective	1	SSC 200 Soil Science	4
	16		**17**

JUNIOR YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
CE 215 Engineering Mechanics - Dynamics	3	BO 360 Intro. to Ecology	3
FOR 353 Air Photo Interp. & Photogram	3	BO 365 Ecology Lab	1
BO 200 Plant Life	4	CE 382 Hydraulics	3
ST 380 Prob. & Stat. for Phys. Sciences	3	COM 110 Public Speaking *or*	
History/Literature Elective[2]	3	COM 112 Interpersonal Comm.	3
	16	ENG 333 Comm. for Sci. & Researchers	3
		NR 300 Natural Res. Measurements	4
			17

SENIOR YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
BAE 471 Land Res. Environ. Engineering	3	ARE(EC)336 Intro. to Res. & Environ. Econ.	3
BAE 473 Into to Surface/Water Qual. Mod.	3	ES 400 Environ. Sciences Proj. Course[3]	3
FOR 401 Watershed & Wetlands Hydrology	4	PS 320 U.S. Environmental Politics *or*	
MEA 565 Hydrogeology	3	PS 336 World Environmental Politics	3
Philosophy, Religion, Visual/Performing Arts Elective	3	Social Science Elective	3
	16	History/Literature Elective	3
			15

Minimum Hours Required for Graduation: 128

Additional graduation requirements:
a. Earn a minimum grade of C in ENG 111 & 112, CH 101, MA 141 & 241, PY 205, NO 300, BAE 471 & 473, ES 400, FOR 401, MEA 565.
b. Achieve foreign language proficiency at the FL_ 102 level.
c. Complete at least one course that focuses on a non-English speaking culture that is selected from the university list in the -- department curriculum handbook. The selected course may also satisfy humanities/social sciences or foreign language - requirements.

[1]Two semesters of physical education are required for graduation. At least one course must fulfill the "Fitness and Wellness" requirement (any PE course at the 100-level). Students may select S/U grading for all PE courses.
[2]12 credit hours of humanities/social science electives, distributed as shown below, must be selected from the university lists in the department curriculum handbook.

a. History or literature - 6 credit hours in any combination of history or literature courses.
b. Philosophy, religion, or visual or performing arts - 3 credit hours.
c. Social science (anthropology, cultural geography, politics and government, psychology, or sociology) - 3 credits.

MINIMUM ENTRANCE QUALIFICATIONS

FRESHMEN:	High School GPA of 3.5 SAT total score of 1100, SATM score of 600 AI=2.7; PGE=2.5; PGM=2.8 Math: place directly into MA 141. Requires Math Achievement Test score, Level II=550 or AP Calculus Test score = 2.
TRANSFERS:	NCSU: Successfully completed at least 28 credit hours with a minimum GPA of 2.75 and completed CH 201/202, ENG 112, and MA 241 with minimum grades of C.
Other institutions:	Successfully completed at least 30 credit hours with a minimum GPA of 3.0 and the equivalents of CH 201/202, ENG 112, and MA 241 with minimum grades of C.

CURRICULUM IN FISHERIES AND WILDLIFE SCIENCES
(See listing under Department of Zoology)

DEPARTMENT OF PARKS, RECREATION AND TOURISM MANAGEMENT

Biltmore Hall, Room 4008
Phone: (919) 515-3276

P.S. Rea, *Head*

Professors Emeriti: T.I. Hines, W.E. Smith, R.E. Sternlof, M.R. Warren; *Professors:* H.A. Devine, P. S. Rea, C.D. Siderelis, J.D. Wellman; *Associate Professors Emeriti:* G.A. Hammon, L.L. Miller, C.C. Stott; *Associate Professors:* A. Attarian, S.L. Kirsch, L.D. Gustke, C.S. Love, B.E. Wilson, G.L. Brothers, R.L. Moore; *Adjunct Associate Professor:* H.K. Cordell; *Assistant Professor:* M.A. Kanters; *Adjunct Instructors:* J.I. Connors, G.R. Worls; *Instructor:* K. Hamilton Brown, E.K. Lindsay, A. Moore; *Associate Members of the Faculty:* C.S. Vick (Cooperative Extension Service).

The department offers an interdisciplinary program allowing students to focus on careers in park management, recreation tourism or sports. Standards adopted by the recreation profession make college graduation a requirement for employment. North Carolina State University has facilities, staff, curriculum, program and an established reputation for comprehensive professional education in the study of parks, recreation, tourism and sport management. The program is nationally accredited.

OPPORTUNITIES
As increased discretionary time becomes available for large segments of the American population, opportunities for growth in the leisure service professions have increased dramatically. A recreation and park professional's goal is to influence people to use their discretionary time wisely and to improve the quality of their lives. This goal is accomplished by providing recreation programs and facilities for people in a variety of settings.

Career opportunities include employment by park and recreation departments operated by county and municipal governments; state agencies such as state parks, federal government with agencies such as the National Park Service, Corps of Engineers, U. S. Forest Service; resorts and country clubs; and sport teams.

Other major employers include youth and family service organizations such as the YMCA, YWCA, Boys' Clubs, Boy and Girl Scouts. Industries employ recreation directors to head employee recreation programs. Areas with perhaps the greatest growth potential for employment are tourism agencies and commercial recreation establishments such as resorts, private clubs, theme parks, and convention and conference centers. Sport management is also a growing profession with a variety of career opportunities.

CURRICULUM IN PARKS, RECREATION AND TOURISM MANAGEMENT

The curriculum in parks, recreation and tourism management offers a broad general education background, basic professional and technical courses, and the opportunity to specialize in a particular field. General education courses are in natural sciences, psychology, sociology, English, mathematics, communication, and economics. Specialized courses are required in statistics and the use of computers.

The curriculum is designed to prepare men and women for a variety of positions in a dynamic and challenging profession. The focus of the curriculum is on management rather than face-to-face leadership. The curriculum provides 42 hours of professional course work that includes recreation philosophy, management techniques and skills, fiscal management, supervision, facility and site planning, programming, administration, and analysis and evaluation. A computer laboratory is utilized in many courses to provide the student with the best current technology available.

In addition to the general education requirements and the core professional requirements, students can begin to attain specialized training through concentration courses. At the beginning of the students' junior year they choose one of the following concentrations: tourism and commercial recreation, park management, natural resource management, program management, or sport management.

Academic studies on campus are supplemented by practical laboratory experiences in the Raleigh area, out-of-state field trips and study opportunities, and a ten-week internship with a park, recreation or tourism agency. Cooperative work-study programs are available.

CURRICULUM IN PARKS, RECREATION AND TOURISM MANAGEMENT

Degree earned: B.S. in Parks, Recreation and Tourism Management

FRESHMAN YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
CFR 134 Computers in Natural Resources	1	Comm./Speech Elective	3
ENG 111 Comp. & Rhetoric[1]	3	ENG 112 Comp. & Reading[1]	3
MA 105 Math. of Finance *or*		Natural Science Elective[3]	4
MA 111 Precalculus Algebra and Trig. *or*		PRT 215 Park & Rec. Maint. Mgmt.	3
MA 114 Intro. to Finite Math. with Applic. *or*		Physical Education Elective	1
MA 121 Elements of Calculus	3		14
PRT 101 Parks, Rec., and Tourism Pract.[2]	1		
PRT 152 Intro. to Parks, Rec. & Tourism[2]	3		
Natural Science Elective[3]	4		
Any 100-level PE in Fitness & Wellness	1		
	16		

SOPHOMORE YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
EC 205 Fundamentals of Economics *or*		PRT 238 Inclusive Recreation	3
ARE 201 Economics of Agriculture	3	PRT 358 The Recreation Program	3
PSY 200 Intro. to Psychology *or*		PEH 280 Emergency Medical Care	2
200-Level Sociology Course	3	Phil., Relig. Vis/Perf. Arts Elective	3
PRT 216 Managing Park and Rec. Facilities	3	History or Literature Elective	3
Advanced Writing Elective[1]	3	Physical Education Elective	1
Physical Education Elective	1		15
	13		

JUNIOR YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
PRT 350 Outdoor Recreation Mgmt.	3	PRT 380 Analysis & Eval. in PRT	3
PRT 359 Leadership, Supervision and Adm.	3	Concentration	3
PSY 376 Human Growth and Dev. *or*		Natural Science (Other) Elective	3
SOC 301 Human Behavior	3	Free Elective	4
Sci., and Technology & Soc. Elective[4,7]	3		13
Statistics Elective[5]	3		
	15		

SUMMER SESSION

PRT 475 Recreation and Park Internship	8

SENIOR YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
PRT 454 Park and Rec. Finance and Adm.	3	PRT 451 Facility and Site Planning	3
PRT 476 Post Internship Seminar	1	PRT 477 PRT Mgmt.	2
Concentration	3	Concentration	3
History or Literature Elective	3	Sci., Technology & Soc. Elective[6,7]	3
Free Elective	3	Free Elective	3
	13		14

Minimum Hours Required for Graduation: 121

[1]Students must receive a "C" or better grade in all English writing courses (111,112, and advanced writing elective)
[2]Students must take PRT 101 and 152 concurrently

[3]Natural Science courses must be from two different basic sciences (biology, chemistry, earth sciences and physics); two of the three courses must have a laboratory.
[4]Course must be selected from the Science/Technology/Society (Science and Technology Perspective) List.
[5]Course must be a 300-level statistics course.
[6]Courses taken to satisfy the Science, Technology and Society requirements must include one of the following courses: FW 221, MDS 201, MDS 301, MDS 302, MDS 303, PHI 322.
[7]One of the courses taken to satisfy the Science/Technology/Society requirements must include one of the following courses: FW 221, MDS 201, MDS 301, MDS 302, MDS 303, PHI 322.
* Foreign language proficiency at the 102 level is required for graduation.
Among the courses taken to fulfill graduation requirements, at least one must focus on a non-English speaking culture.

MINOR IN PARKS, RECREATION AND TOURISM MANAGEMENT
The academic minor in Parks, Recreation and Tourism Management, is offered to students interested in gaining a basic knowledge of the parks, recreation and tourism field and an understanding of the importance of leisure and recreation in American society. It is not intended to prepare students for a professional career in parks, recreation and tourism. Seven hours of required courses and nine hours of electives are necessary to complete the minor. The program provides a background in recreation and park management which is useful to students who will assume full-time careers that are associated with recreation and park services, and become involved in the park and recreation field as a volunteer, program leader or policy-making board member with such organizations as the Scouts, Y's, art advisory councils, and conservation organizations.

CONCENTRATIONS
Program Management Concentration (9 hours) **(Select Three Courses)**

PRT 353, Camp Administration (3)
PRT 365, Arts Management in Recreation (3)
PRT 366, Administration of Recreation Sports (3)
PRT 442, Recreation and Park Interpretive Services (3)

Natural Resource Management Concentration (10 hours)

PRT 442, Recreation and Park Interpretive Services (3)
FW 221, Cons. of Natural Resources (3) **OR** FOR 472, Renewable Res. Policy and Management (3)
BO 403, Systematic Botany (4) **OR** FOR 212, Dendrology (4)

Park Management Concentration (9 hours)

CS 200, Introduction to Turfgrass Management (4)
HS 342, Landscape Horticulture (3)
HS 471, Tree and Grounds Maintenance (4)

Tourism and Commercial Recreation Concentration (9 hours)

PRT 220, Commercial Recreation and Tourism (3)
PRT 320, Convention and Visitor Services (3) **OR** PRT 420, Resort Management and Operations (3)
ACC 210, Accounting I, Concepts of Fin. Reporting (3) **OR** ACC 280, Managerial Accounting (3)

Sport Management Concentration (12 hours)

PRT 366, Administration of Recreation Sports (3)
PEC 478, Sport Science (3)
PEC 479, Sport Management (3)
BUS/PRT 406, Sports Law (3)

DEPARTMENT OF WOOD AND PAPER SCIENCE
Biltmore Hall, Room 2105
Phone: (919) 515-5807

M. J. Kocurek, *Head*
R. D. Gilbert, *Director of Graduate Programs*

Alumni Distinguished Undergraduate Professor: M.W. Kelly; *Alumni Distinguished Graduate Professor and Elis & Signe Olsson Professor:* J.S. Gratz; *Reuben B. Robertson Professor:* H-M Chang; *Buckman Distinguished Scientist:* M.A. Hubbe; *Professors:* H-M Chang, J. Denig, J.S. Gratzl, J.A. Heitmann Jr., L. Jahn, H. Jameel, M.W. Kelly, M.J. Kocurek, H.G. Olf, E.A. Wheeler; *Professors Emeriti:* A.C. Barefoot, E.L. Deal, E.L. Ellwood, I.S. Goldstein, C.A. Hart, R.G. Hitchings, R.G. Pearson, R.J. Thomas; *Adjunct Professors:* L.L. Edwards, T.K. Kirk, R. Szymani; *Associate Professors:* M.A. Hubbe, B. Kasal, A.G. Kirkman, M.K. Ramasubramanian, J.S. Stewart; *Adjunct Associate Professors:* R.B. Phillips, H.A. Stewart; *Associate Professors Emeriti:* R.C. Allison, R.C. Gilmore, S.J. Hanover; *Assistant Professors:* J.F Kadla, P.H. Mitchell, P.N. Peralta, R.A. Venditti; *Adjunct Assistant Professor:* A.G. Raymond Jr.; *Senior Research Associate:* C.L. Chen; *Research Associate:* R.L. Lemaster; *Reseorch Assistant:* W.S. Bryan; *Director of Applied Research:* M.V. Byrd; *Associate Member of the Faculty:* R.D. Gilbert.

The wood-based industry of North Carolina, as well as throughout the South, is a vital part of the nation's economy. In terms of the dollar value of shipments of wood and paper products, the South leads all regions of the country. North Carolina manufactures more wood household furniture than any other state, ranks third in shipment value for all wood and paper products and second in number of employees and wages paid. Thus, many opportunities exist in North Carolina and other southern states for careers in the wood-based industry.

The Department of Wood and Paper Science offers two curricula leading to Bachelor of Science degrees - Pulp and Paper Science and Technology, and Wood Products. Both curricula prepare men and women for careers in the wood and paper and allied industries or in government agencies connected with wood resources.

CURRICULA IN PULP AND PAPER SCIENCE AND TECHNOLOGY

Adrianna G. Kirkman, *Undergraduate Coordinator*

The Pulp and Paper Science and Technology curriculum prepares students for careers in pulp and paper, an industry that ranks as the fifth-largest manufacturing industry in the United States. Science, engineering, and mathematics form the basis for a multidisciplinary approach to understanding the fundamental manufacturing principles involved. Students study wood pulping processes, chemical and by-product recovery systems, and pulp bleaching. In addition, various paper-making operations such as refining, sizing, coating, and drying are studied.

Two concentrations are available emphasizing the technological or engineering aspects of pulping and papermaking. The Technology Concentration provides an extensive background in the pulp and paper manufacturing processes and elective credit hours for studies in marketing, economics, management or other concentrations of interest to the student. Greater depth in the engineering principles underlying pulp and paper manufacturing can be obtained from the Chemical Engineering Concentration. Students who have completed the Chemical Engineering Concentration in pulp and paper science and technology can, in cooperation with the College of Engineering and with an additional semester of study, earn a Bachelor of Science in Chemical Engineering as a second degree.

OPPORTUNITIES

Graduates of this curriculum find opportunities for challenging careers as process engineers, product development engineers, process control chemists, technical service engineers, quality control supervisors, and production supervisors. Design and construction engineering companies employ graduates as project engineers, and pulp and paper machinery companies use their education and skills for technical service and sales positions. Opportunities for managerial and executive positions are available to graduates as they gain experience.

SUMMER INTERNSHIP

All pulp and paper majors are required to work one summer in a pulp or paper mill. One hour of academic credit is granted after completion of 12 weeks of mill work and presentation of a satisfactory report. In addition, students are urged to work in mills the other two summers, as the work provides valuable practical experience. Departmental advisors assist students in locating summer work.

REGIONAL PROGRAM

The pulp and paper curriculum is a regional program approved by the Southern Regional Education Board as the undergraduate program to serve the Southeast in this field.

SCHOLARSHIPS

Approximately 95 undergraduate academic scholarships are granted annually to new and continuing students by more than 100 companies comprising the Pulp and Paper Foundation.

CURRICULUM IN PULP AND PAPER SCIENCE AND TECHNOLOGY, TECHNOLOGY CONCENTRATION

Degree earned: B.S. in Pulp and Paper Science and Technology

FRESHMAN YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
CH 101 Chemistry - A Molecular Science	3	CH 201 Chemistry - A Quantitative Science	3
CH 102 General Chemistry Lab	1	CH 202 Quantitative Chemistry Lab	1
E 115 Intro.to Computing Environments	1	ENG 112 Comp. & Reading[1]	3
EC 205 Fundamentals of Economics	3	MA 241 Calculus II	4
ENG 111 Comp. & Rhetoric[1]	3	PY 205 Physics for Engr. & Sci. I	4
MA 141 Calculus I	4	WPS 102 Intro. Pulp & Paper Technology	1
WPS 101 Intro. to Wood and Paper Science	1		**16**
Any 100-level PE in Fitness & Wellness	1		
	17		

SOPHOMORE YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
CH 221 Organic Chemistry I	4	CH 223 Organic Chemistry II	4
CHE 205 Chemical Process Prin.[1]	4	PY 208 Physics for Engr. & Sci. II	4
MA 242 Calculus III	4	WPS 216 Papermaking Technology[1]	3
WPS 215 Pulping Technology[1]	3	Advised Elective[3]	3
Physical Educaiton Elective	1	Humanities/Soc.Sci./History/Literature[2]	3
	16		**17**

SUMMER SESSION

WPS 211 Pulp and Paper Internship	1

JUNIOR YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
CH 331 Intro. Physical Chemistry	4	ENG 331 Comm. for Engr. & Tech.	3
ST 361 Intro.to Statistics for Engr.	3	WPS 332 Wood and Pulping Chemistry	3
WPS 310 Paper Properties & Additives	3	WPS 355 Pulp & Paper Unit Processes I	3
Phil., Relig. Vis/Perf. Arts Elective[2]	3	WPS 371 Pulping Process Analysis	2
H/SS SCI/Technology/SOC[2]	3	WPS 381 Pulp/Bleach Chemistry Lab	1
	16	H/SS History/Literature[2]	3
			15

SENIOR YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
WPS 410 Mo. & Sim. Pulp & Paper Process	3	WPS 472 Paper Process Analysis	3
WPS 475 Process Control	3	WPS 460 Environ. Issues	1
WPS 360 Pulp and Paper Unit Processes II	3	WPS 465 Paper Products Des.	2
H/SS PSY/PS/SOC/ANT[2]	3	WPS 416 Projec Mgmt.	3
Advised Elective[3]	3	Humanities/Soc. Sci. Elective[3]	3
	15	Advised Elective[3]	3
			15

Minimum Hours Required for Graduation: 128

[1]Minimum of C grade required for graduation in PPT
[2]21 credit hours of H/SS electives must be selected from the university approved lists in the department curriculum handbook
[3]Contact your advisor for information on Advised Elective Courses

*Foreign language proficiency at the FL 102 level required for graduation for all students admitted as freshman or transfer students beginning Summer and Fall 1994
**At least one course must be taken which focuses on a non-English speaking culture; the selected course may also satisfy humanities/social sciences or foreign language requirements

CURRICULUM IN PULP AND PAPER SCIENCE AND TECHNOLOGY, CHEMICAL ENGINEERING CONCENTRATION
Degree earned: B.S. in Pulp and Paper Science and Technology

FRESHMAN YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
CH 101 Chemistry - A Molecular Science	3	CH 201 Chemistry - A Quantitative Science	3
CH 102 General Chemistry Lab	1	CH 202 Quantitative Chemistry Lab	1
E 115 Intro. to Computing Environments	1	ENG 112 Comp. & Reading	3
EC 205 Fundamentals of Economics	3	MA 241 Calculus II	4
ENG 111 Comp. & Rhetoric[1]	3	PY 205 Physics for Engr. & Sci. I	4
MA 141 Calculus I	4	WPS 102 Intro. to Pulp & Paper Technology	1
WPS 101 Intro. to Wood and Paper Science	1		16
Any 100-level PE in Fitness & Wellness	1		
	17		

SOPHOMORE YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
CH 221 Organic Chemistry I	4	CH 223 Organic Chemistry II	4
CHE 205 Chemical Process Prin.[1]	4	CHE 225 Chemical Process Systems	3
MA 242 Calculus III	4	MA 341 Applic. Diff. Equations I	3
WPS 215 Pulping Technology[1]	3	PY 208 Physics for Engr. & Sci. II	4
Physical Education Elective	1	WPS 216 Papermaking Technology[1]	3
	16		17

SUMMER SESSION

WPS 211 Pulp and Paper Internship	1

JUNIOR YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
CHE 311 Transport Processes I	3	CHE 312 Transport Processes II	3
CHE 315 Thermodyn I	3	Option Elective CHE 316[3]	3
ENG 331 Comm. for Engr. & Technology	3	WPS 332 Wood & Pulping Chemistry	3
WPS 310 Paper Properties & Additives	3	WPS 371 Pulping Process Analysis	2
CH Quantitative Analysis	4	WPS 381 Pulp & Bleach Chemistry Lab	1
	16	H/SS/History/Literature[2]	3
		H/SS/PHI/REL/ARTS[2]	3
			18

SENIOR YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
WPS 360 Pulp & Paper Unit Processes II	3	WPS 472 Paper Process Analysis	3
WPS 410 Mod & Sim P & P Processes	3	WPS 460 Environ. Issues in Paper Industry	1
WPS 475 Process Control	3	WPS 465 Paper Prod. Design	2
H/SS SCI/Technology/SOC[2]	3	WPS 416 Project Mgmt.	3
H/SS History/Literature[2]	3	H/SS PSY/PS/SOC/ANT[2]	3
	15	Humanities/Soc. Sci. Elective[2]	3
			15

Minimum Hours Required for Graduation: 128
With Option Elective: 131

Additional Courses for CHE Degree: CHE 330, CHE 446, CHE 450, ECE 331 or MAT 201
[1]Minimum of C required for graduation in PPT; additional restrictions may apply for the CHE degree
[2]21 credit hours of H/SS electives must be selected from the College of Engineering List
[3]To complete requirements for a second BS in CHE in nine semesters, the indicated CHE courses must be taken as "Option Elective"
*Foreign language proficiency at the FL 102 level required for graduation for all students admitted as freshman or transfer students beginning summer and fall 1994
** At least one course must be taken which focuses on a non-English speaking culture, the selected course may also satisfy humanities/social sciences or foreign language requirements.

MINOR IN PULP AND PAPER SCIENCE AND TECHNOLOGY
The Pulp and Paper Technology Minor is available to all undergraduate students enrolled in the university as degree candidates, except Pulp and Paper Technology majors. The minor requires 15 credit hours. Six hours of required courses provide a comprehensive overview of pulping and paper-making science and technology, including pulping, bleaching, chemical recovery, recycled fibers, stock preparation, papermaking, coating, printing, converting, and environmental aspects. Nine elective hours may be chosen from areas including paper properties, wood chemistry, unit operations, computer modeling and simulation of processes, project management, environmental issues, or process control. This course will provide more in-depth exposure to the basic pulping, bleaching and paper-making processes.

The Pulp and Paper Technology Minor, with its focus on paper-making science and technology, is intended to be especially valuable to students majoring in programs leading to careers in corporate or government positions which would interface with the paper and related industries. Students interested in business, scientific or engineering specialties which may interface with or be employed by these industries will find the minor especially useful.

The office location and phone number for students and others inquiring about the PPT minor is: Department of Wood and Paper Science, 2105 Biltmore Hall, 919-515-5807.

CURRICULUM IN WOOD PRODUCTS
M. W. Kelly, *Undergraduate Coordinator*

The wood products industry is of major importance to the economy of North Carolina and the Southeast. It ranks third in the state in the value of shipments, behind only textiles and tobacco products, and it is second to textiles in the number of employees. The managerial opportunities for graduates with a B.S. in Wood Products are excellent. Graduates of this program have a broad education in the humanities, communication skills, social and natural sciences, as well as the professional training required for managerial positions in the wood products industry. The curriculum, similar to a material science program, is based on the natural resource wood with an emphasis on industrial manufacturing and management. Graduates' knowledge of wood as a raw material enables them to properly design and process a variety of wood-based products of value to society. As the availability of nonrenewable resources decreases and their costs increase, the demand for wood, a renewable resource, increases. Currently, career opportunities are excellent and continued strong demand for individuals with a wood products education is anticipated.

OPPORTUNITIES
The Wood Products curriculum at North Carolina State University, which is accredited by the Society of Wood Science and Technology, prepares graduates for production supervision, staff positions and management responsibilities in all types and sizes of wood industries. Careers also include positions with both large and small companies manufacturing consumer wood products such as furniture. Graduates are also in demand by chemical and equipment suppliers to the wood manufacturing industries of chemicals and equipment.

SCHOLARSHIPS
Approximately six undergraduate merit scholarships are granted annually to new and continuing students through the Forestry Foundation.

TECHNICAL ELECTIVES
The curriculum provides a minimum of 15 credit hours for technical electives which may be used to pursue a minor in a variety of areas including business management, industrial engineering, graphic communications, forestry management or economics. For those undergraduates desiring exposure to more than one area, the technical electives may be chosen from these and other areas, depending on the individual's career goals.

DUAL DEGREE PROGRAMS
Dual degree programs are available whereby students can obtain, in addition to a Bachelor of Science in wood products, a second Bachelor of Science degree in forestry, pulp and paper science, business management or in other areas. Credits beyond those required for the single degree program are necessary and a minimum of an additional year of study is usually required. Individuals interested in a dual degree should contact the appropriate departmental office.

CURRICULUM IN WOOD PRODUCTS
Degree earned: B.S. in Wood Products

FRESHMAN YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
CFR 134 Computers in Forest Resources	1	CH 101 Chemistry - A Molecular Science	3
ENG 111 Comp. & Rhetoric[1]	3	CH 102 General Chemistry Lab	1
MA 131 Analytic Geom. & Calculus A[2]	3	ENG 112 Comp. & Reading	3
WPS 202 Wood Anatomy and Properties	3	MA 231 Analytic Geom. & Calculus B[2]	3
Any 100-level PE in Fitness & Wellness[3]	1	WPS 203 Wood Physical Properties	4
Phil., Relig. Vis/Perf. Arts Elective	3	Physical Education Elective[3]	1
	15		15

SUMMER SESSION
WPS 205 Wood Products Practicum 5

SOPHOMORE YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
EC 201 Intro. to Economics I	3	GC 101 Engineering Graphics I	2
PY 211 General Physics I	4	PY 212 General Physics II	4
Basic Science Elective	3	ST 311 Intro. to Statistics	3
Sci., Technology, & Soc. Elective	3	WPS 350 Wood Products Literature	2
Free Elective	3	History or Literature Elective	3
	16		14

SUMMER SESSION
WPS 210 Forest Products Internship 1

JUNIOR YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
ENG 311 Comm. Engr. & Technology	3	IE 311 Engineering Economics Analysis	3
(Comm. or Sp. Elective)		WPS 302 Wood Processing II	4
WPS 301 Wood Processing I	4	WPS 344 Intro. to Quality Control	3
WPS 319 Prin. of Wood Science	3	History or Literature Elective	3
Humanities/Soc.Sci. Elective	3	Technical Elective[3]	3
Technical Elective[3]	3		16
	16		

SENIOR YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
WPS 441 Wood Mechanics	4	WPS 444 Wood Composites	3
WPS 482 Senior Topics in WPS	2	WPS 450 Wood Industry Case Studies	2
Technical Electives[3]	6	ANT., GEO., PS., PSY., or SOC Elective	3
Free Elective	3	Technical Elective[3]	3
	15	Free Elective	3
			14

Minimum Hours Required for Graduation: 126

[1]D grades not acceptable
[2]Students with appropriate math aptitude are encouraged to register for MA 141 and MA 241
[3]Technical Electives are selected from business, management, science or applied fields with advisor approval to meet the career goals of the student.

*Foreign language proficiency at the FL 102 level is required of all NC State graduates.

MINOR IN WOOD PRODUCTS
The Wood Products minor is available to all undergraduate students, except Wood Products majors, enrolled in the university as degree candidates. Due to the various semester credit hours of the elective courses, the semester hours required for a this minor may be as low as 17 or as high as 20 credits. Eleven hours of required courses provide a general background in wood anatomy, physical properties, and wood-based composites. Elective courses (minimum two courses required) may be chosen from areas including wood processing, wood mechanics, quality control, and wood-polymer interactions.
The Wood Products minor, with its focus on wood properties and processing, is designed to be especially valuable to students majoring in programs leading to careers in areas such as structural design, furniture manufacturing, and forestry. Students interested in natural and renewable materials will also find the minor useful.

COLLEGE OF HUMANITIES AND SOCIAL SCIENCES

106 Caldwell
NCSU Box 8101
Raleigh, NC 27695-8101

Phone: *(919)515-2468*
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M.A. Zahn, *Dean*
M.M. Sawhney, *Associate Dean*
M.T. Zingraft, *Associate Dean of Research*
G.W. O'Brien, *Associate Dean of Graduate Programs*
E.T. Funkhouser, *Assistant Dean for Undergraduate Academic Affairs*
R.C. Kochers Berger, *Assistant to the Dean for International Studies*
J.N. Wall, *Director of Honors/Scholars Programs*
D.B. Greene, *Coordinator of Arts Studies*
L.H. Hambourger, *Coordinator of Evening Programs and Assistant to the Dean*
M.T. Leach, *Academic Director of Diversity Affairs*

The College of Humanities and Social Sciences offers programs of study which lead to baccalaureate and advanced degrees in the disciplines of the humanities and social sciences. The college also offers courses in these disciplines which are required in all undergraduate degree programs. In this way the university provides its students the opportunity to prepare for a full life in the professions and occupations that require intellectual flexibility, broad knowledge, and a basic comprehension of human beings and their problems.

The College of Humanities and Social Sciences is comprised of seven departments: Communication, English, Foreign Languages and Literatures, History, Philosophy and Religion, Political Science and Public Administration, and Sociology and Anthropology (also a department in the College of Agriculture and Life Sciences). The Division of Multidisciplinary Studies, an academic unit responsible for interdisciplinary programs, is affiliated with the college; the division also administers the Social Work Program.

The college offers undergraduate majors in arts applications, communication, English, French, history, multidisciplinary studies, philosophy, political science, religious studies, social work, sociology, and Spanish. In addition, special options or concentrations are available within some of the major programs: communication disorders, mass communication, public relations, and theatre (major in communication); rhetoric, writing, and language (major in English); philosophy of law/law and political philosophy (major in philosophy or political science); anthropology (major in sociology), and criminal justice (major in political science or sociology). A Teacher Education Option is available in English, French, Spanish, and social studies (history, political science, sociology). Enrollments in teacher education programs may be limited. Degrees granted include the Bachelor of Arts, Bachelor of Science, Bachelor of Social Work, Master of Arts, Master of Science and Doctor of Philosophy, as well as professional degrees in political science and sociology.

ACADEMIC MINORS:

MINOR IN INTERNATIONAL STUDIES
Students who wish to add a significant international dimension to their departmental majors may pursue the Minor in International Studies. This program enables students to explore international topics, issues, and research from cross-cultural, transnational perspectives. The program provides tools that students can use to understand better the global context of the modern world and to learn the international dimensions of their chosen field of study.

MINOR IN MUSIC
The College of Humanities and Social Sciences offers a Minor in Music to all undergraduate students in the university. The music minor is designed to foster creative thought, aesthetic understanding, and artistic self-expression. A total of 18 credit hours must be taken to complete this minor with emphasis in performance, theory/composition or history/literature. Students are expected to demonstrate their level of musical/intellectual accomplishment in a public recital or through submission of papers summarizing results of concentrated analysis and research from one or more courses. Students interested in the minor should refer to the music minor curriculum listed under the Department of Music.

DOUBLE DEGREE PROGRAMS:

ELI WHITNEY DOUBLE DEGREE PROGRAM IN TEXTILES AND INTERNATIONAL STUDIES
This joint program between the College of Textiles and the College of Humanities and Social Sciences allows a student to earn a B.S. in Textile and Apparel Management and a B.A. in Multidisciplinary Studies with a concentration in international studies. This dual degree is designed to prepare students for work in the increasingly international textile industry. The program includes all the technical course requirements associated with the textile and apparel management degree. For the B.A. in Multidisciplinary Studies, students choose from among three areas of concentration: the Pacific Rim (language study in Japanese or Chinese), Latin America (language study in Spanish), or Europe (language study in German or Italian). The program, which takes four to five years to complete, also includes possible overseas internships. Merit scholarship awards are available for high-achieving students who participate in the double degree program in textiles and international studies. For more information, contact Dr. Helmut Hergeth, Textile Management and Technology, 3318 Textile Building, (515-6574) or the Assistant Dean for Undergraduate Affairs, College of Humanities and Social Sciences, 106 Caldwell Hall, (515-2468).

COOPERATIVE EDUCATION
Cooperative Education in humanities and social sciences seeks to broaden the student's intellectual horizons and at the same time to provide an introduction to the world of business, industry, government, or finance in preparation for a career after graduation. In this program the freshman and senior years are usually spent on campus while the sophomore and junior years are devoted either to alternate periods of on-campus study and off-campus work or to a parallel arrangement of part-time work and part-time study on a continuous basis. The student is paid for work experiences by the employer. Ordinarily the program takes five years to complete, but those who are willing to attend summer school or take on a summer co-op assignment can finish in four years. Transfer students are eligible, and all interested students are urged to apply early in the academic year. The program is also open to graduate students although less time is required on work assignments. Further information may by obtained from Cooperative Education, 212 Peele Hall, (515-4421).

HONORS AND SCHOLARS PROGRAMS:
The College of Humanities and Social Sciences sponsors the Scholars of the College Program (part of the University Scholars Programs) for students who show exceptional academic promise. The participants in this residential program take special sections of freshman- and sophomore-level courses and participate in a series of cultural events and weekly forums. In their junior year they participate in special Junior Scholars seminars and attend monthly forums. For upper-level students, each department in the college offers an honors program designed to encourage outstanding students to develop their intellectual potential to the fullest extent possible through individualized study, special seminars, and close association with faculty members in their major field.

JEFFERSON SCHOLARS IN AGRICULTURE AND THE HUMANITIES
The Thomas Jefferson Scholars Program in Agriculture/Life Sciences and the Humanities is a joint program of the College of Agriculture and Life Sciences and the College of Humanities and Social Sciences. It is a double degree which permits participants to have two concentrations: one in an area of agriculture/life sciences and one in an area of humanities/social sciences. The double degree program may be individually designed to meet each student's particular interests and career goals. The purpose of the program is to produce potential leaders in agriculture and the life sciences who have not only technical expertise but also an appreciation for the social, political, and cultural issues that affect decision-making.
Each spring a number of entering freshmen are chosen to receive scholarships to participate in the Jefferson program. In addition, other qualified students may choose to pursue a double major in agriculture/life sciences and the humanities under the Jefferson program.
Students interested in applying to the Jefferson Scholars program should contact Dr. George Barthalmus, Associate Dean, College of Agriculture and Life Sciences, Box 7642, North Carolina State University, Raleigh, NC 27695 (515-2615) or Dr. Edward T. Funkhouser, Assistant Dean, College of Humanities and Social Sciences, Box 8101, North Carolina State University, Raleigh, NC 27695 (515-2467), before January 15.

BENJAMIN FRANKLIN SCHOLARS PROGRAM
A limited number of freshmen in the College of Engineering are selected to participate in the Benjamin Franklin Scholars program. In addition to their major courses, each Benjamin Franklin Scholar develops an individualized, five-year plan of work focused on a central theme in the humanities and social sciences. Students completing the program receive a Bachelor of Science degree in an engineering discipline or computer science and a bachelor's degree in multidisciplinary studies.

This double-degree program, a joint undertaking of the College of Engineering and the College of Humanities and Social Sciences, provides a unique opportunity to integrate a solid base of knowledge in technology or science with the broad philosophical perspective of the humanities. The curriculum for the double-degree program has four main components: a strong general education, specially designed interdisciplinary and problem-defining courses, all technical course requirements associated with the engineering or computer science degree, and a 30-hour multidisciplinary concentration designed by students in consultation with their advisers. With careful planning, this program can be completed in five years.
For more information, contact the Assistant Dean for Academic Affairs, College of Engineering, 118 Page Hall, or the Assistant Dean for Undergraduate Affairs, College of Humanities and Social Sciences, 106 Caldwell Hall.

GIFFORD PINCHOT SCHOLARS PROGRAM
The Gifford Pinchot Scholars Program, a joint program with the College of Forest Resources, follows the model established by other double degree programs. Academically talented students are invited to pursue simultaneously a B.S. degree in Forest Management through the College of Forest Resources and a B.A. degree in a major in Humanities and Social Sciences through the College of Humanities and Social Sciences. The Pinchot Scholars Program is limited to a small number (10 or fewer per year) of highly qualified and motivated students. Scholarship support is available to some participants in the Pinchot Scholars Program.

Pinchot Scholars follow the requirements for the B.S. in Forest Management (with one exception: the physics sequence PY 211-212 is not required). For the B.A. degree, they follow a 30-hour major concentration in multidisciplinary studies. Included in this major are two core requirements: MDS 340 Perspectives in Agricultural History (3 credits) and MDS 498 Senior Thesis (3 credits). Participants also complete an additional MDS seminar (1 credit). In addition, Pinchot Scholars complete all the general education requirements for a B.A degree in the College of Humanities and Social Sciences. A total of 155 credit hours is required for the double degree which students can complete in four and a half years.

The theme of the multidisciplinary studies major will involve placing forest management in the context of cross-cultural perspectives, global issues, and public policy. The exact set of courses that will constitute the major will be determined by students in consultation with their advisory group, subject to the approval of the Multidisciplinary Studies Committee. Each student is assigned an advisory group consisting of an academic advisor from each college, plus a mentor from the forest industry. Pinchot Scholars also participate in existing cooperative activities with other double-degree program scholars. For more information, contact the Associate Dean for Academic Affairs, College of Forest Resources, 1022-N Biltmore, Box 8001 or the Assistant Dean for Undergraduate Academic Affairs, College of Humanities and Social Sciences, 106 Caldwell, Box 8101.

DaVINCI SCHOLARS PROGRAM
The DaVinci Scholars Program is a joint program between the College of Humanities and Social Sciences and the School of Design. Students completing the DaVinci Scholars Program will earn two degrees within five or six years: a bachelor's degree in one of the five undergraduate disciplines in the School of Design and a B.A. or B.S. degree in the College of Humanities and Social Sciences. DaVinci Scholars will earn their first degree in design with no adjustment in their design requirements. They will elect a second major from any of those available in the College of Humanities and Social Sciences, including Multidisciplinary Studies. They must meet all requirements for both degrees.

The primary purpose of the double degree program is to provide students with a strong liberal education as a complement to their professional degree study. In some cases, however, students will also improve their employment opportunities by selecting study that directly supports their professional in design. For example, students majoring in graphic design who take a second degree that focuses on writing improve their opportunities for employment in communications. A student in architecture with a second degree in history may improve opportunities for graduate study in architectural history, preservation, or urban planning. Study of foreign language may improve opportunities for international design practice.

Students who wish to participate in the DaVinci Scholars should apply to the Associate Dean of the School of Design within their first semester of study in the School of Design and by the time of formal declaration of major in their second semester of study. DaVinci Scholars will participate in special programs and meet as a group for regular discussions and advising. Interdisciplinary seminars led by School of Design and College of Humanities and Social Sciences faculty will focus on issues relevant to the nature of the disciplines. Other programs may include lectures and field trips. Depending on the availability of funds, DaVinci scholars will receive scholarships toward participation in the program.

SCHOLARSHIP PROGRAM
In addition to the university-wide awards available, the College of Humanities and Social Sciences offers the following merit scholarships to entering freshmen:

J. Carlie Adams, Sr. Endowed Scholarship ($500)
Bess B. and Lynton Yates Ballentine Scholarship ($1000)
Frances W. and Gerald O. T. Erdahl Memorial Scholarship ($1000)
Other departmental scholarships include:
Claire Simmons Allan-Samson Memorial Scholarship in Moral Philosophy ($1000)
Mary M. Penney Scholarship in English ($1000)
For further information contact:

Dr. John Wall, Director, Honors/Scholars Program, College of Humanities and Social Sciences, North Carolina State University, Box 8105, Raleigh, NC 27695-8105

FOLGER INSTITUTE
North Carolina State University is a member of the Folger Institute of Renaissance and Eighteenth-Century Studies, a unique collaborative enterprise sponsored by the Folger Shakespeare Library in Washington, D.C., and 20 universities in the Middle Atlantic region. Each year the institute offers an interdisciplinary program in the humanities—seminars, workshops, symposia, colloquia, and lectures. Admission is open to faculty and students of North Carolina State University, and a limited number of fellowships are available through the campus Folger Institute Committee.

ALEXANDER HAMILTON SCHOLARS PROGRAM
The Alexander Hamilton Scholars Program permits students to earn a B.A. in Multidisciplinary Studies emphasizing international studies and a B.S. in Accounting, a B.S. in Business Management, or a B.A. in Economics. The B.A. in Multidisciplinary Studies is a specially designed program focusing on a specific region of the world and one of its major languages. Students may choose from the following regions: China or Japan and the Pacific Rim, France or Germany and Western Europe, Francophonic Africa, Latin America, and the Middle East.

Key elements of the Alexander Hamilton Program include at least three semesters of foreign language study beyond the level required for admission to the University, at least two courses in history, political science, literature, or anthropology directed specifically at the region of study, a management capstone course (business policy and strategy or economics seminar) with a strong global orientation, and several additional courses on topics such as international relations, global affairs, and intercultural communication. Each Hamilton scholar is required to complete at least one field experience lasting a minimum of six weeks which will provide immersion in the language and culture of the student's focus region.

Hamilton scholars will participate in special programs throughout their enrollment that are designed to increase their exposure to leading-edge management practices, international business, and foreign cultures. These programs will include activities such as special lectures and seminars, corporate tours and field trips, and scholar's banquets. For additional information about the Alexander Hamilton Scholars Program, contact the Associate Dean for Academic Affairs, College of Management, 112 Nelson Hall, or the Assistant Dean for Undergraduate Academic Affairs, College of Humanities and Social Sciences, 106 Caldwell Hall.

DEPARTMENT OF COMMUNICATION

www.ncsu.edu/chass/communication/

Winston Hall, Room 201
Phone: (919) 515-2450

J. C. Hammerback, *Head*
C. R. Branker, *Assistant Head*
P. N. Long, *Coordinator of Advising*

Professors: L.R. Camp, R.M. Entman, W.J. Jordan, J.C. Hammerback, L.W. Long, R.L. Schrag; *Professors Emeriti:* W.G. Franklin, C.A. Parker; *Associate Professors:* P.C. Caple, D.A. DeJoy, E.T. Funkhouser, V.J. Gallagher, M. Javidi, R. Leonard, H.E. Munn Jr., B.L. Russell; *Assistant Professors:* T. Hallett, M. Johnson, A. Lucchetti, J. Macoubrie, N.H. Snow, S. Wiley; *Lecturers:* J. Alchediak, C. R. Branker, J. Heaton, T.J. Kauffman, P.N. Long, M.F. Pandich, S. Stein; *Teaching Technician:* J. Willard.

The Bachelor of Arts in Communication program provides study and training in human communication for professionals entering business, industry, non-profit organizations, or government service. Today, many organizations are seeking graduates with demonstrated competencies in human communication to fill positions which require constant and skillful contact with a wide variety of internal and external publics. Depending upon their area of specialization, graduates may find employment opportunities in positions such as communication consultants, media specialists, trainers, public relations specialists, therapists, or performers. Many graduates choose to enter graduate or law schools.

PROGRAMS OF STUDY
The Communication major calls for successful completion of at least 36 semester credit hours of Communication (COM) courses. Three of these courses, COM 110, COM 112, and COM 190, totaling nine semester credit hours, are completed by all students majoring in Communication. The remaining credit hours in the major come from courses completed in one or more of the following concentrations offered by the Department of Communication:

Communication Disorders: The undergraduate portion of preparation for Speech-Language Therapist or Audiologist careers. A Master's degree is required for entry into these professions.
Mass Communication: A broad curriculum in the structure, operation, and social effects of the mass media in the United States with emphasis on electronic media, including courses in broadcast and non-broadcast media writing and production, media criticism, and media history.
Public and Interpersonal Communication: A curriculum emphasizing analytical and skills approaches to the study of human communication processes and problems.
Public Relations: Instruction in the communication theories and methods applied by organizations to establish and maintain mutually beneficial relationships with employees, governments, stock holders, and other publics.
Theatre: Studies in stage directing, acting, scenic and lighting design, and stagecraft. African-American dramaturgy and children's touring theatre are special features of this program. Courses are taught at Thompson Theatre on the NC State campus.

HONORS PROGRAM
The honors program in Communication provides academically talented students an opportunity to expand their curriculum and abilities through in-depth, guided study. Candidates for the program must have achieved junior standing with a TGPA of at least 3.250 and a minimum 3.500 GPA in the minor after completion of at least nine credits of Communication courses.

Students admitted to the program must complete a total of nine credit hours in at least two of the following three types of courses: COM 300 and 400-level honors or honors contract courses, COM 500-level courses and an Honors senior thesis seminar (3 credits). Honors students will select and work closely with an honors faculty adviser.

Students who complete a plan of study meeting the above requirements and graduate with a minimum TGPA of 3.250 and a GPA for Communication courses of at least 3.500 will have successfully completed the Communication honors program. Completion of the program will be noted on the student's transcript and diploma, and in the commencement and honors convocation programs.

CURRICULUM NOTES
- Students must enroll in COM 190 during their first semester as a Communication major.
- A student must have completed 15 hours at NC State with a minimum overall GPA of 2.700 to transfer upon request from another NC State curriculum into the Communication major. Students with GPAs less than 2.700 but above 2.000 may apply for admission to the major. Two application periods are scheduled each year. Contact the department for an application form and deadline information.
- No final grades below "C" are permitted for courses used in the Communication major.
- To qualify for graduation, each student must have a minimum GPA of 2.000 for all courses completed at NC State, and at least a 2.000 GPA for all courses taken in the Communication major.
- COM 146, Business and Professional Communication, is intended for students in majors other than Communication. Students majoring in Communication may not use this course to satisfy any requirement within the 36-credit-hour major.

MINORS
A minor in Theatre is offered. Also, the Communication Department and the Departments of English and Multidisciplinary Studies jointly offer a Film Studies minor. Literature detailing the requirements for these minors is available at the main department office. Those interested in the Journalism minor at NC State should contact the English Department.

INTERNSHIPS
The Department operates an internship program which offers qualified Seniors the opportunity to gain work experience in the Communication field. The internship is required of all students in the Public Relations concentration, but students from the other Communication concentrations may also participate in this program.

DEPARTMENT OF ENGLISH

www.chass.ncsu.edu/english/

Tompkins Hall, Rooms 131, 246
Phone: (919) 515-3866

T. D. Lisk, *Head*
C. A. Prioli, *Associate Head*
B. M. Blackley, *Assistant Head for Scheduling*
L. T. Holley, *Coordinator of Advising*
R. V. Young, *Director of Graduate Programs*
J. Ferster, *Director of the Freshman Program*

William C. Friday Distinguished Professor: Walt A. Wolfram; *Alumni Distinguished Undergraduate Professor:* M.T. Hester; *Professors:* B.J. Baines, J.W. Clark, J. Ferster, J.A. Gomez, J.M. Grimwood, A.H. Harrison, M.T. Hester, L.T. Holley, J.J. Kessel, L.H. MacKethan, W.E. Meyers, C.R. Miller, C.A. Prioli, L. Smith, J.J. Smoot, A.F. Stein, J.N. Wall Jr., W. Wolfram, R.V. Young; *Professors Emeriti:* G.W. Barrax, P.E. Blank Jr., L.S. Champion (Alumni Distinguished Undergraduate Professor), J.D. Durant, M. Halperen, H.G. Kincheloe, A.S. Knowles, B.G. Koonce, F.H. Moore, M.S. Reynolds, M.C. Williams, P. Williams Jr.; *Associate Professors:* E.Y. Amiran, L.J. Betts, M.P. Carter, D.H. Covington, A.M. Davis-Gardner, C. Gross, D. Herman, S.B. Katz, M.F. King, R.C. Kochersberger, R.C. Lane, D.L. Laryea, J.E. Morrison, C. Nwankwo, M.E. Orr, A.M. Penrose, J.O. Pettis, L.R. Severin, J.J. Small, J.F. Thompson, H.C. West, D.B. Wyrick; *Assistant Professors:* S. Dicks, M. Douglas, C. Haller, N. Halpern, W.E.Haskin, S.M. Katz, D.E. Keetley, P. LaCoste, L. May, B. Mehlenbacher, J.D. Morillo, M. Pramaggiore, S.M. Setzer, K. Shepherd-Barr, E. Thomas, C. Warren, T. Weldon; *Senior Lecturer:* P.R. Cockshutt.

The Department of English offers basic and advanced courses in writing, language, and literature. The freshman courses, required of all undergraduate students, develop skill in expository writing and in analytical reading of literary and non-literary works. Advanced courses in writing available to all students cover a variety of areas, including journalism, technical and business writing, and creative writing. These courses give students opportunities to pursue special personal and career interests, as do courses in literature, linguistics, film, and folklore.

The department offers a Bachelor of Arts major in English with four options: language and literature; world literature; rhetoric, writing, and language; and teacher education. It also offers a Bachelor of Science major. Internships available to qualified students provide practical experience as well as an understanding of how academic studies are relevant to the workplace.

In addition, the department offers two graduate degrees: a Master of Arts in English and a Master of Science in Technical Communication. (See *Graduate Catalog* for details.)

A five-course certificate program in Professional Writing, available to students not seeking a degree at NC State, offers preparation in practical writing and editing, including both journalism and technical writing.

OPPORTUNITIES
A degree in English provides both liberal education and practical knowledge about the role of writing and language in the everyday world. It leads to careers in such fields as teaching, journalism, advertising, public relations, personnel management, technical writing, business writing, and creative writing. It sharpens the analytical and interpretive skills needed for professional and managerial careers, and it serves as an excellent preparation for students planning to study law or medicine and for those intending to do graduate work in literature and rhetoric.

ENGLISH HONORS PROGRAM
The Honors Program in English provides courses that enrich the intellectual life of the English major. The Honors student contributes to and learns from seminar settings, takes up the obligation of independent study, produces documents representing sustained and logically articulated research practices, and earns recognition for excellent work beyond ordinary requirements.

For admission, students must have a minimum GPA of 3.000, and must have completed at least three English courses above the freshman level with a minimum GPA of 3.250. Successful completion of the Honors Program requires completion of 9 hours of honors courses with grades of A or B, a GPA of at least 3.400 in NC State English courses and a minimum overall GPA of 3.250.

BACHELOR OF ARTS IN ENGLISH
Major in English, Language and Literature Option--The student must schedule 42 semester hours beyond the usual six hours in freshman composition. A core of 24 hours, including Introduction to Literary Studies, is required of all majors. Beyond these courses, the student may pursue special interests within the limits of recommended categories.

Major in English, World Literature Option--The Student must schedule 42 semester hours beyond the usual six hours in freshman composition. At least 21 of these hours must consist of ENG or ENG/FL courses; at least 12 of them must consist of FL- or ENG/FL courses. A core of 33 hours, including Introduction to Literary Studies, meets requirements for courses in periods, regions, and methods. Students must achieve proficiency in a foreign language, usually at the 300 level. The Lawrence Rudner Option in World Literature enables students to achieve a fully- rounded education in literature by mixing courses in English and American literature with courses in foreign-language literatures.

Major in English, Rhetoric, Writing, and Language Option--The student must schedule 42 semester hours beyond the usual six hours in freshman composition. For their 18 hours of English electives, students choose at least 6 hours in concepts and theories and 6 hours in practical applications, with an additional 6 hours in either area. This combination allows students to learn how to write and design documents for specific uses, to understand why strategies work, and to develop resources for solving new problems. With appropriate electives and a choice of a minor, students may prepare for careers in journalism, technical writing, information services, or creative writing or may enter graduate study in these areas or in rhetoric and composition.

MAJOR IN ENGLISH, CONCENTRATION IN TEACHER EDUCATION
English majors may enroll in the Teacher Education Option offered by the College of Humanities and Social Sciences in cooperation with the College of Education and Psychology. Students who complete this program are eligible to apply for the certification to teach English in secondary schools in North Carolina. The requirements of the program include 33 semester hours in professional courses and 36 semester hours in English beyond the usual six hours in freshman composition (total 128 credit hours required for graduation). Students desiring to enter this program should declare their intention before the spring of the sophomore year. Students are required to file a formal application for admission which must be approved in order for them to participate. Enrollments in the Teacher Education Option may be limited.

BACHELOR OF SCIENCE IN ENGLISH
Major in English--Students, in consultation with their departmental advisers, must schedule 30 semester hours beyond the usual six hours in freshman composition.

MINOR IN ENGLISH
The Department of English offers a Minor in English to majors in any field except English. To fulfill this minor, students must:
- complete 15 hours (5 English courses) at or above the 200 level
- take at least 6 hours (2 courses) at or above the 300 level
- take at least 3 hours (1 course) at or above the 400 level
- earn a grade of C or better in all courses credited to the minor.

MINOR IN JOURNALISM
With the Department of Communication, the Department of English offers a Minor in Journalism, open to students in any major. It consists of the following courses: ENG 214, ENG 215, ENG 315, COM 204, and one of the following: COM 234, COM 334, COM 421. A grade of C or better is required in all courses.

MINOR IN LINGUISTICS
The Department of Foreign Languages and Literatures and the Department of English offer a Minor in Linguistics to majors in any field. Among students likely to be attracted to the minor are those interested in second language acquisition.
To complete the minor fifteen hours of designated courses are required, as well as the completion of a foreign language through the 202 level.

MINOR IN WORLD LITERATURE
The Departments of English and of Foreign Languages and Literatures offer a Minor in World Literature to all undergraduate students. It requires six courses: FL 350, CL 495, and four courses in one or more literatures (other than a student's major) chosen from an approved list. A grade of C or better is required in all courses.

MINOR IN TECHNICAL AND SCIENTIFIC COMMUNICATION (TSC)
The department of English offers a Minor in Technical and Scientific Communication (TSC) for students not majoring in English interested in supplementing their studies in technical, scientific, or other fields. In addition to gaining valuable skills in document design, editing, collaboration, and revision, students minoring in TSC will be introduced to numerous genres including proposals, reports, science writing, users guides, reference manuals, and online documentation. Critical perspectives towards the role of communication in the creation of scientific and technical knowledge will be examined. Fifteen hours of course work are required to complete the minor: ENG 214, ENG 314, one of ENG 331, ENG 332, or ENG 333, ENG 421, and one of ENG 425, ENG 520, or ENG 583 (Usability Studies, number to be designated).

DEPARTMENT OF FOREIGN LANGUAGES AND LITERATURES

http://sasw.chass.ncsu.edu/fl/fl.htm

1911 Building, Room 117
Phone: (919) 515-2475

L.R. Schehr, *Head*
D.M. Marchi, *Assistant Head*
A.B. Kennedy, *Coordinator of Advising*

Professors: T.P. Feeny, G.F. González, J.R. Kelly, L.R. Schehr, M.L. Sosower, J.H. Stewart, M.A. Witt; *Professors Emeriti:* A.A. González, M. Paschal, G.W. Poland, E.M. Stack; *Associate Professors:* S.T. Alonso, V. Bilenkin, H.G. Braunbeck, G.A. Dawes, M.M. Magill, A.C. Malinowski, D.M. Marchi, L.A. Mykyta, Y.B. Rollins, M.L. Salstad; *Associate Professors Emeriti:* R.A. Alder, W.M. Holler, V.M. Prichard, S.E. Simonsen, H. Tucker Jr.; *Assistant Professors:* J.S. Despain, M.D. Garval, H. James, J.M. Levis, J. Mari, J.P. Mertz, G.P. Meyjes, A. Taj; *Lecturers:* D.F. Adler, A.B. Kennedy, S. Navey-Davis, Q.Q. Sun.

OPPORTUNITIES

The expansion of international relations makes the knowledge of foreign languages a critical need for today's professional. The student of foreign languages is not limited to teaching, translating or interpreting. There are careers in politics, diplomacy, commerce, business, agriculture, science, and research in which a thorough knowledge of foreign languages is crucial for success. The demand for multilingual personnel extends to all fields of human enterprise and will continue to grow in the coming years.

BACHELOR OF ARTS IN FRENCH OR SPANISH

All the general requirements for the Bachelor of Arts degree must be met, including six hours of literature survey within the Department of Foreign Languages and Literatures or in British and American literature or any combination of these. Degree designations are B.A. in French Language and Literature, B.A. in Spanish Language and Literature, B.A. in French Language and Literature with Teacher Education Option, and B.A. in Spanish Language and Literature with Teacher Education Option.

Outstanding students may become members of the Alpha Lambda chapter of Phi Sigma Iota, National Foreign Languages Honor Society; of the Xi Omicron chapter of Sigma Delta Pi, National Hispanic Honor Society; and of the Gamma Alpha chapter of Debra Slav., National Slavic Honor Society. A departmental honors program in French and Spanish is also available to eligible students.

Major in French or Spanish--Students must complete 36 hours beyond the 201 level, including a senior seminar/capstone course. Majors must take 12 additional hours of advised electives. These are waived for students who choose to double major (in Business Management or Political Science, for example), and for those who choose the Teacher Education Option.

Major in French or Spanish with Teacher Education Option In collaboration with the College of Education and Psychology and the Department of Curriculum and Instruction, the Department of Foreign Languages and Literatures offers a program leading to a French or Spanish teaching license in North Carolina, grades K-12.

The requirements of the program include 30 semester hours in professional education classes and 39 semester hours in French and Spanish beyond the 102 level. Candidates must consult with their academic adviser as early as possible for the proper planning of their curriculum. Application for admission to teacher education candidacy is made during the spring
semester of the sophomore year.

HONORS PROGRAM

The Honors Program in Foreign Languages and Literatures assists academically talented majors to realize their fullest potential as undergraduates in the field. To participate, students must have a TEPA of 3.000+ and SPA of 3.250+ after 9 hours in the major.
Successful completion of the program requires an overall GPA of 3.250+, with 9+ hours of Honors work, at least 6 of them in Foreign Languages and Literatures.

Students will extend their critical thinking skills, refine foreign language skills, and discover significant scholarly areas of particular interest to them through various avenues, such as: Honors options in regular classes, in which students explore the material in greater depth or breadth; development and execution of an independent project, assisted by a faculty mentor and; an approved study abroad project. Completion of departmental Honors is noted on the student's transcript and diploma and at Commencement.

PROGRAMS ABROAD

Summer study programs are offered in Austria, France, Germany, India, Mexico, Taiwan, and semester-long programs in Spain and France.

MINOR IN CLASSICAL STUDIES

The Minor in Classical Studies offers an excellent foundation for advanced work in other academic disciplines as well as professional programs in law, medicine, and finance. The minor gives students an opportunity to develop a keener perception and better understanding of the cultural forces at work in the contemporary world. And by presenting a broad selection of courses in the various disciplines of literature, philosophy, and history, the minor provides students with a sound introduction to studies in antiquity.

Requirements for the minor include five courses selected from the following: GRK 201 or LAT 201; GRK 310 or GRK 320; PHI 300 or REL 312; HI 403 or HI 404; and HI 405 or 406.

MINORS IN FOREIGN LANGUAGES, LITERATURES, AND CULTURES

Minor programs in the Department of Foreign Languages and Literatures include courses in language, literature, and civilization. The minor program requires 15 hours of study in Chinese, French, German, Italian, Japanese, Russian, or Spanish, beginning at the 201 level; in Classical Greek, beginning at the 101 level.

Undergraduate students majoring in any area of study at NC State are eligible to minor in a foreign language. Students may not, however, major and minor in the same language.

MINOR IN JAPANESE STUDIES
Students who take a Minor in Japan Studies are required to complete, with a grade of C or better, 18 hours of courses distributed as follows: Tested language competence through FLJ 202, with at least six hours of Japanese language instruction at NC State at or above the FLJ 201 level and four of the following cognate courses: EC 470; ENG/FL 394; HI 263; HI 472; PS 342; PS 346; MDS 295. With the Minor adviser's approval, additional Japan-related classes may be used to fulfill the cognate course requirement.

DEPARTMENT OF HISTORY

www.ncsu.edu/chass/history/

Harrelson Hall, Room 162
Phone: (919) 515-3307

E. Sylla, *Interim Head*
J.E. Crisp, *Assistant Head*
D.A. Zonderman, *Coordinator of Advising*
Gail O'Brien, *Director of Graduate Programs*

Alumni Distinguished Undergraduate Professor Emeritus: B.F. Beers;*Alumni Distinguished Undergraduate Professors:* J.P. Hobbs, J.M. Riddle; *Alumni Distinguished Professor* (for graduate teaching): J.D. Smith;*Professors:* J.R. Banker, C.H. Carlton, A.J. De Grand, D.P. Gilmartin, W.C. Harris, J.P. Hobbs, A.J. La Vopa, L.O. McMurry, G.W. O'Brien, J.K. Ocko, S.T. Parker, J.M. Riddle, R.H. Sack, R.W. Slatta, J.D. Smith, E.D. Sylla, K.S. Vincent;*Professors Emeriti:* M.L. Brown, M. S. Downs, R.W. Greenlaw, D.E. King, L.W. Seegers, M.E. Wheeler, B.W. Wishy; *Associate Professors:* J.E. Crisp, W.A. Jackson, O.J. Kalinga, W.C. Kimler, K.P. Luria, S. Middleton, S.L. Spencer, G.D. Surh, P. Tyler, K.P. Vickery;*Associate Professor Emeritus:* R.N. Elliott, J.A. Mulholland; *Associate Members of the Faculty:* F.A. Moyer; *Assistant Professors:* D. Ambaras, R. Bassett, H. Brewer, A.F. Khater, M.Kim, A. Mitchell; *Adjunct Assistant Professors:* V.L. Berger, J.W. Caddell, J.C. Cashion, J.J. Crow, H.E. Mattox, D.J. Olson, W.S. Price Jr., H.K. Steen; *Lecturer:* J. Woodard

An understanding of the historical background of our times is expected of the educated person. The Department of History makes it possible for students to gain this understanding through a wide range and variety of courses at all levels from introductory through graduate.

A broad offering of introductory courses is available to satisfy the undergraduate history requirement or part of the humanities and social sciences requirements in most university curricula. Students in the College of Humanities and Social Sciences are required to take two courses in history—one dealing with a culture significantly different from our own in pre-industrial Western or non-Western societies and the other dealing with our own culture in the United States or post-industrial Western societies.

Honors students are eligible for membership in Phi Alpha Theta, the national history honorary society. Some introductory and advanced undergraduate courses and graduate courses are offered in the evening.

The department offers two Master of Arts degrees. Students interested in enhancing their understanding of history, obtaining advanced teaching credentials, or pursuing doctoral work elsewhere may take the traditional graduate program. Students interested in applied history may take the public history program. Some financial assistance is available.

OPPORTUNITIES
A history major has traditionally served as a foundation for careers in such professions as teaching and law. In recent years undergraduates have frequently augmented studies in history with computer science, foreign language, or business administration, combinations which have proved attractive in business and government service.

The prospect of new career ladders in public education has prompted renewed interest in an M.A. in history with advanced teaching certification. Multiplication of records of every kind has created a steady demand for historians with master's degrees in applied or public history.

HONORS PROGRAM
The departmental honors program in History allows selected students to pursue intensive, individually directed work in history. Students are invited to enter the honors program (usually in the junior year) if they have a cumulative GPA of at least 3.000. and a history GPA of a least 3.300, with a minimum of 9 history hours completed. Students must take 9 hours of individual, directed study (HI498, 495, 496) leading toward the writing of an Honors Thesis. Students must also take an extra history seminar (HI 491) and participate for two semesters in a non-credit honors reading seminar.

To graduate with honors in history, a minimum history GPA of 3.300 and an overall GPA of 3.250 is required. Graduating honors students receive recognition at commencement and an "honors" designation on their permanent record.

BACHELOR OF ARTS IN HISTORY
A history major must take 30 hours of course work in history in addition to the six hours required of all students in the College of Humanities and Social Sciences. These 30 hours must include a 491 seminar. At least 24 of the 30 hours must be at the 400 level. Sufficient courses are offered to complete the history requirements for the B.A. in the evening.

Major in History with Social Studies Teacher Education --History majors may enroll in the teacher education program offered by the College of Humanities and Social Sciences in cooperation with the College of Education and Psychology. Students who complete this program are eligible for certification to teach social studies in secondary schools in North Carolina.

In addition to the Bachelor of Arts degree requirements, students are required to take professional courses in education and psychology and additional social sciences courses (126 credit hours required for graduation). Students desiring to enter this program should declare their intention during their sophomore year. Admission is competitive and the limited in Teacher Education Option programs.

BACHELOR OF SCIENCE IN HISTORY
A Bachelor of Science in History involves 27 hours of course work, with 15 hours at the 400 level, including an HI 491 seminar.

MINOR IN HISTORY
A Minor in History shall consist of six courses in history; one introductory course in pre-industrial or non-Western history (i.e., HI 207, 208, 209, 215, 216, 263, 264, 275, or 276); one introductory course in United States or post-industrial Western history (i.e., HI 205, 210, 221, 222, 233, 251, or 252); four three-

hour courses in history at the 300 level or above, two of which must be at the 400 level. All six courses must be completed with a grade of C or better to satisfy the requirements of the minor.

DIVISION OF MULTIDISCIPLINARY STUDIES

www2.ncsu.edu/ncsu/chass/mds

2806 Hillsborough Street
Phone: (919) 515-2470

C.D. Korte, *Head and Director of Graduate Programs*
P.W. Hamlett, *Assistant Head*

Professors: D.B. Greene, C.D. Korte; *Professors Emeriti:* D.A. Adams, A.C. Barefoot; *Associate Professors:* C.C. Brookins, P.W. Hamlett, R.L. Hoffman, L. Severin, R.A. Waschka II; *Assistant Professors:* D. Crumbley, J. Herkert, S. Warren; *Lecturers:* E. Malloy-Hanley, C.L. Stalnaker.

Multidisciplinary Studies Degree Committee:
C. Crossland, *Curriculum and Instruction*
A. Kennedy, *Foreign Languages and Literatures*
J. Wallace, *Sociology and Anthropology*
T.L. Honeycutt, *Computer Science*
C.B. Kimbrough, *Business Management*
C.L. Stalnaker, *Multidisciplinary Studies, Chair*
E. Malloy-Hanley, *Multidisciplinary Studies*
R. Hoffman, *Multidisciplinary Studies*
W. Jordan, *Communications*

Multidisciplinary Studies is an academic unit responsible for interdisciplinary programs dealing with contemporary and historical issues and problems. Courses are often taught by teams of faculty drawn from the division and from the academic disciplines relating to the problems or issues under consideration. These courses are open to students in all curricula. In addition, the Social Work Program is administered as part of the Division of Multidisciplinary Studies.

BACHELOR OF ARTS AND BACHELOR OF SCIENCE IN MULTIDISCIPLINARY STUDIES

The Multidisciplinary Studies program allows students to design their own academic majors. Instead of following the requirements for a major in one of the traditional disciplines, the candidate for the Bachelor of Arts or Bachelor of Science degree in Multidisciplinary Studies has the responsibility of organizing a concentration or field of specialization from one or more disciplines. A concentration in Latin American Studies might, for example, combine related courses in language, literature, history, economics, sociology, and political science.

The freshman and sophomore basic requirements for the multidisciplinary studies program are the same as for the other Bachelor of Arts and Bachelor of Science programs in humanities and social sciences. In satisfying basic requirements in language, humanities, social science, mathematics, and natural science, students should, whenever possible, choose those courses that are most appropriate as background for the courses in their major concentrations.

To become candidates for a self-designed major in multidisciplinary studies, students must first get application forms and information from the office of the Division of Multidisciplinary Studies, 2806 Hillsborough Street and then prepare a tentative proposal which includes a list of courses comprising 30 credit hours for the B.A. and 27 credit hours for the B.S. and an essay of 500 words explaining the reasons for making this set of courses the field of specialization. The student's proposal is reviewed by a faculty sponsor and submitted to the Multidisciplinary Studies Degree Committee for consideration.

After a thorough examination to determine whether the set of courses proposed as a multidisciplinary major is academically sound and coherent, the committee will recommend that the Dean of Humanities and Social Sciences accept the proposals, or they will be sent back to the students and their sponsors with suggestions for modification and resubmission.

BACHELOR OF ARTS IN ARTS APPLICATIONS

The Division of Multidisciplinary Studies also offers a degree program in Arts Applications which allows students to develop a foundation in one of the arts and, on that foundation, learn the social or technological applications of the arts in a modern world. Examples are computers and the arts, scientific illustration, arts management and arts education.

Students take 21 hours in foundation courses, 6 hours in linking courses (such as computers and music or arts and politics), a 3-hour capstone course (MDS 494) designed for Arts Application majors, and an advised elective to support their particular interests and career objectives.To enroll in the program, student come to the Arts Studies Office, Room 242 in the 1911 Building.

HONORS PROGRAM

The Honors Program in Multidisciplinary Studies provides able students the opportunity to integrate the various strands of their concentrations in a capstone project. The program also provides a context in which students can sharpen their thinking on the unique challenges and opportunities of interdisciplinary work.

To be admitted into the MDS Honors Program, students must have earned nine credit hours in their MDS concentrations, have an overall GPA of 3.000 and a major GPA of 3.250.

To graduate with Honors in MDS students must have a GPA of 3.250, and must have completed the MDS capstone course, " Independent Studies for MDS Honors Students," and have earned six additional credit hours in courses that are both Honors courses and also part of their MDS concentrations.

MINOR IN AFRICANA STUDIES

The Minor in Africana Studies provides a comparative and interdisciplinary study of the Black experience in Africa and the Americas. Three required courses include an Introduction to African-American Studies (MDS 240), Black American Literature (ENG 248), and Afro-American History (HI 372 or 373). Two elective courses may be selected from a list of designated courses in such disciplines as anthropology, history, language, sociology, social work, and communication. The minor is designed to bring together students from diverse backgrounds and curricula who share a common interest in the African American experience.

MINOR IN ARTS STUDIES
The Minor in Arts Studies is open to all undergraduate majors in the university. This interdisciplinary minor is designed to enrich the student's university experience, to serve as a foundation for learning and understanding in the arts beyond the university years, and to stimulate intellectual development in ways that may reinforce or complement the objectives of the student's major. This minor provides the student with a fundamental understanding of the historical, theoretical, and practical disciplines of the arts.

A total of eighteen credit hours must be taken to complete this minor. Students interested in the minor should refer to the Arts Studies courses listed under "Arts Studies" in the course description section of this catalog. These courses are described in detail under their departmental prefixes.

MINOR IN ENVIRONMENTAL SCIENCE
The Environmental Science Minor provides a pathway for students from all disciplined to acquire a basic understanding of their biophysical and socioeconomic environments, and the effects of humankind's activities upon these environments. With this knowledge, individuals will be better able to interpret environmental issues that emerge daily, and to influence public and private activities that affect the environment.

The minor consists of 15 credit hours of course work, selected from more than 20 eligible courses subdivided into four groups. To complete the minor, a student must take at least one course from each group, plus one additional course.

MINOR IN FILM STUDIES
The Departments of English and of Communication and the Division of Multidisciplinary Studies offer a Minor in Film Studies. The minor provides an introduction to the nature of the film experience, some background in the history of the medium, and the opportunity for in-depth study of selected topics.

Fifteen hours of course work are required to complete the minor: ENG 282 and either COM 364 or COM 374, plus nine credit hours selected from the following: ENG 382, ENG 492, COM 244, COM 364 or 374 (whichever course was not taken to fulfill the requirement above), MDS 496, HI 336, and DN 316 (prerequisite waived, consent of instructor). Any students taking this minor cannot count courses from the minor toward their majors.

MINOR IN SCIENCE, TECHNOLOGY, AND SOCIETY
The Minor in Science, Technology, and Society is a fifteen-hour, multidisciplinary minor providing students an opportunity to appreciate and understand better the roles that science and technology play in the larger sociocultural context. A goal of the minor is to help students develop the ability to order and integrate the diverse aspects of their educations.

Two essential components of this ability are sensitivity to the moral dimensions of scientific and technological inquiry as affecting how people may live or want to live and an appreciation of the practical implications of scientific and technical theory. In addition, the Minor in Science, Technology, and Society enables students to increase the breadth of their familiarity with science and technology.

MINOR IN WOMEN'S AND GENDER STUDIES
The Women's and Gender Studies Minor provides all students in the university the opportunity for interdisciplinary study in women's gender issues from a wide variety of cultures, backgrounds and historical eras. In addition, it introduces the often unacknowledged contributions made by women in various fields of endeavor through course offerings in nine departments, the undergraduate minor helps students to examine common assumptions about gender relations using feminist theory and methodologies across disciplinary boundaries.

DEPARTMENT OF PHILOSOPHY AND RELIGION

www2.ncsu.edu/ncsu/chass/philo

Winston Hall, Room 101
Phone: (919) 515-3214

H.D. Levin, *Interim Head*
M.K. Cunningham, *Coordinator of Advising*

Alumni Distinguished Undergraduate Professors: W.R. Carter, T.H. Regan; *Professors:* W. Adler, W.R. Carter, J.Levine, C.M. Pierce, T.H. Regan, A.D.VanDeVeer; *Professors Emeriti:* P.A. Bredenberg, R.S. Bryan; *Associate Professors:* D.F.Austin, J.W. Carroll, M.K.Cunningham, R.M. Hambourger, D.M.Jesseph, B.B.Levenbook, H.D.Levin, R.B.Mullin, R.O.Savage, T.K.Stewart; *Associate Professors Emeriti:* W.C. Fitzgerald, W.L.Highfill, R.S.Metzger; *Assistant Professors:* D.D. Auerbach, N.B. Dohrmann, T.J. Hinton, R.M Jaffe, C.L. Miller

Philosophy and Religious Studies confront the most important questions with the most rigorous standards, relying on over two millennia of accumulated wisdom from the best minds. They provide excellent training for any line of work where there's value in the ability to think straight and express oneself clearly -- virtually every line of work. Law school, medical school and other professional school admission boards know this. A double major in this department and another (e.g., political science for law, biochemistry for medicine) can make an applicant very attractive to a professional school. Majors receive excellent training for graduate school in Philosophy or Religious Studies, as is shown by the department's record in placing graduates in top graduate programs in each field.

The Department of Philosophy and Religion is located on the World Wide Web at: http://www2.ncsu.edu/ncsu/chass/philo/

SCHOLARSHIPS
The Claire Simmons Allan-Samson Memorial Scholarship in Moral Philosophy, a renewable scholarship of $1000 per year, will be awarded annually to worthy students who have expressed an interest in issues in animal rights.

OPPORTUNITIES
For students interested in postgraduate study, information compiled by post-college professional schools reveals that undergraduate majors in philosophy and religion who apply to graduate schools of management have in the past scored extremely well in combined total scores on the Graduate Management Admission Test, with exceptional scores on verbal fields.

Those undergraduate philosophy majors who apply to law schools have been shown to be more likely to be admitted than virtually any other field represented. Students intending to study philosophy and religion in graduate programs have consistently scored much higher than other students on the verbal section of the Graduate Record Examination. Because of this capability of scoring so well on the various postgraduate tests, many businesses and industries welcome philosophy and religion majors into their training programs.

PHILOSOPHY HONORS PROGRAM

The honors program in Philosophy offers an enriching and challenging educational experience to qualified majors.
Admission to the program requires junior standing, completion of nine hours in the major, and a 3.250 GPA overall and in the major. Honors students must complete at least nine credit hours of honors option course work in Philosophy (including PHI 335 and PHI 498) and write an honors thesis (PHI 498) to be evaluated by the instructor for PHI 498 and one other member of the Philosophy faculty. Graduation requires a 3.250 GPA overall and in the major.

Successful completion of the program is noted on the student's transcript and diploma, and in the commencement and honors convocation programs.

RELIGIOUS STUDIES HONORS PROGRAM

The honors program in Religious Studies guides outstanding majors in independent, critical inquiry of the academic study of religion.

Admission to the program requires junior standing, completion of nine hours in the major, and a 3.250 GPA overall and in the major. Honors students must complete at least nine credit hours of honors option course work in Religious Studies (including at least one 400-level course) and write an honors paper as part of an independent study course (REL 498) which is evaluated by an honors committee.

Graduation requires a 3.250 GPA overall and in the major. Successful completion of the program is noted on the student's transcript and diploma, and in the commencement and honors convocation programs.

BACHELOR OF ARTS IN RELIGIOUS STUDIES

Candidates for the Bachelor of Arts in Religious Studies must complete 33 credit hours in the major. The courses in religious studies must include one course in Western religious traditions (REL 317, 320, 323, 326, 327); one course in non-Western religious traditions (REL 331, 332, 407, 408); one course in Biblical Studies (REL 202, 311, 312, 314; GRK 202); and a minimum of 9 hours of advanced studies (REL 402, 407, 408, 460, 481, 484, 491*,496*, 498*).
* can be taken twice for credit

BACHELOR OF ARTS IN PHILOSOPHY

Candidates for the Bachelor of Arts in Philosophy must complete 33 hours in philosophy, including the three hours in philosophy required of all CHASS students; either Logic (LOG 201) or Symbolic Logic (LOG 335); the courses in the development of Western philosophic thought (PHI 300 and 301); an introductory course in value theory (PHI 275 or 321); one advanced course in value theory (PHI 306, 309, 311, 313, 322); two courses in contemporary philosophy (PHI 330, 331, 332, 333); one-credit writing courses in each of three core areas of philosophy (PHI 494, 495 and 496); the seminar Writing and Research in Philosophy (PHI 497); and two additional philosophy courses (other than PHI 250).

Major in Philosophy with a Concentration in Philosophy of Law - The concentration requires 39 hours, with at least 27 hours in philosophy (in addition to either PHI 275 or PHI 321, which may be taken to meet college requirements) and at least 9 hours in political science. Three advised electives are required in addition to five core courses: PHI 309, PHI 312, PHI 313, PS 308, and PS 361. Four background courses (12 hours), and three writing courses (3 hours) must be taken: either Logic (LOG 201) or Symbolic Logic (LOG 335); the courses in the development of Western philosophic thought (PHI 300 and PHI 301); either PHI 331 or PHI 332; and one-credit writing courses in each of three core areas of philosophy (PHI 494, 495, 496).

BACHELOR OF SCIENCE IN PHILOSOPHY

Candidates for the Bachelor of Science in Philosophy must complete 30 hours in philosophy, including the 3 hours in philosophy required of all CHASS students. These must include the courses in the history of Western philosophic thought (PHI 300 and PHI 301); Symbolic Logic (LOG 335); Philosophy of Science (PHI 340); an introductory course in value theory (PHI 275 or PHI 321); one advanced course in value theory (PHI 306, 309, 311, 313, 322); one course in contemporary philosophy (PHI 330, 331, 332, 333); one-credit writing courses in each of three core areas of philosophy (PHI 494, 495 and 496); the seminar Writing and Research in Philosophy (PHI 497); and one additional philosophy course (other than PHI 250).

MINORS

Students wishing to take any of the following academic minors need to complete the departmental form declaring intention to do so.

MINOR IN JAPAN STUDIES

Students who take a Minor in Japan Studies are required to complete with a grade of C or better 18 hours of courses distributed as follows: Tested language competence through FLJ 202, with at least six hours of Japanese language instruction at NC State at or above the FLJ 201 level and four of the following cognate courses: EC 470; ENG/FL 394; HI 263; HI 472; PS 342; PS 346; MDS. With the Minor adviser's approval, additional Japan-related classes may be used to fulfill the cognate course requirement.

MINOR IN COGNITIVE SCIENCE

Students who take a Minor in Cognitive Science are required to complete with a grade of C or better fifteen hours of courses, distributed as follows: PSY 320 (Cognitive Processes); PSY 340 (Environmental Ergonomics) or PSY 546 (Human Information Processing); PHI 331 (Philosophy of Language); PHI 332 (Philosophy of Psychology); PHI/PSY 425/525 (Introduction to Cognitive Science).

MINOR IN PHILOSOPHY

Students who take a Minor in Philosophy are required to complete with a grade of C or better fifteen hours of courses in selected fields in philosophy, including a course in the history of philosophy (3 credit hours), a course in normative (ethics and ethics-related) philosophy (3 credit hours), a course other than one in normative philosophy, but not including logic or the history of philosophy (3 credit hours).

MINOR IN RELIGIOUS STUDIES

Students who take a Minor in Religious Studies are required to complete with a grade of C or better fifteen hours of courses in selected fields of religious studies. In order to ensure a wide study of the field, students are required to select at least one course in Western religious traditions and at least one course in non-Western religious traditions. REL 101 and REL 102 may not be counted in the minor.

DEPARTMENT OF POLITICAL SCIENCE AND PUBLIC ADMINISTRATION

www2.ncsu.edu/ncsu/chass/ps/
Caldwell Hall, Room 211
Phone: (919) 515-2481

J.H. Svara, *Head*
E. O'Sullivan, *Director of Public Administration Graduate Programs*
C. E. Griffin, *Director, Master of International Studies*
T. Inlow, *Coordinator of Advising*

Professors: C.K. Coe, D.M. Daley, G.D. Garson, M.S. Soroos, J.H. Svara, D.W. Stewart, J.O. Williams;*Professors Emeriti:* W.J. Block, A. Holtzman, E.R. Rubin; *Associate Professors:* S.H. Kessler, J.M. McClain, R.S. Moog, E. O'Sullivan, T.V. Reid, J.E. Swiss, M.L. Vasu;*Associate Professors Emeriti:* J.H. Gilbert, C.E. Griffin, H.G. Kebschull, K.S. Peterson; *Assistant Professors:* W.A. Boettcher, M.A. Dimock, R.F. Stephen, A.J. Taylor; *Visiting Assistant Professors:* J.R. Horner, S.K. Straus; *Lecturers:* J.A. Delp, T. Inlow, P.M. Pavlik

The Department of Political Science and Public Administration offers basic and advanced courses in all major fields of the discipline: American government and politics (local, state, and national), public law and criminal justice, public administration, comparative politics, international relations and global issues, political theory, and methodology of political science. The department affords opportunities for the study of government and administration to students in other curricula and schools.

Graduate courses in political science are available to advanced undergraduates. See listing of graduate degree programs and consult the *Graduate Catalog*.

The department provides opportunities for internships with political parties and campaigns, lobbyists, non-profits, and all levels of government, including the North Carolina General Assembly Legislative Internship Program. Majors in political science with distinguished academic achievements are annually invited to join Zeta Epsilon Chapter of Pi Sigma Alpha, the national political science honor society.

OPPORTUNITIES

There are a number of careers and professions for which a major in political science, or extensive study of government and politics, can be most useful. This is true especially for those planning to seek careers in teaching, the legal profession, criminal justice agencies, state and local government, urban planning, the federal bureaucracy, journalism or in any of the organizations that seek to monitor political processes or to influence the content of public policy. Private firms also seek managers and public affairs specialists who have a knowledge of the functioning of the political system and of politics in general.

HONORS PROGRAM

Nine credit hours of specialized coursework designed to challenge academically talented majors and allow them to realize their greatest potential as political science students. Required for admission to the program: 3.250 GPA both overall and in the major, completion of 9 hours of PS coursework, and completion of either PS 371 or PS 471.

Majors admitted to the program complete a substantial research project in consultation with faculty honors advisor (6 credit hours). Also required: either one 500-level PS course or an honors-option 400-level political science course (3 credit hours). Successful completion of the program is noted on the student's transcript, diploma, and at commencement.

BACHELOR OF ARTS IN POLITICAL SCIENCE

Major requirements are 30 hours of political science course work; grades of C- or better for courses applied towards the major with a minimum GPA of 2.000 for all political science courses taken; 21 hours at the 300-level or above, including two 400-level courses, one of which must be a seminar; PS 201; and at least six hours in each of three pairs of subfields (Pair A: American Politics/Public Policy and Administration, Pair B: International or Comparative Politics, Pair C: Political Theory/Social Science Methods).

CRIMINAL JUSTICE OPTION

The department offers a Criminal Justice Option for students interested in the nature and causes of crime as well as the processes of making and implementing criminal justice policy. The option includes coursework in both sociology and political science. Students fulfill the normal requirements for the College and the major, but choose 28 hours from a prescribed group of public law and criminal justice courses. The option also includes a fieldwork component, which allows students to work in a criminal justice agency in the senior year. The program is suitable for those interested in a management or policy-making position in police, court, correctional, or probation and parole agencies.

LAW AND POLITICAL PHILOSOPHY CONCENTRATION

The Concentration in Law and Political Philosophy is an interdisciplinary program designed for students who are interested in the theoretical and legal dimensions of political life. It seeks to develop a broad understanding of the relationship between law and politics and the moral and philosophical questions which are central to both. The concentration is fulfilled by successful completion of 12 hours of core course requirements, 9 hours of recommended electives, and completion of the normal political science major requirements. Six hours of the core course requirements and at least 3 hours of the recommended electives will be taken in the Department of Philosophy and Religion. Courses in the concentration provide a humanistic perspective on legal and political questions. The program is suitable for those interested in a career in law or government or those who hope to pursue graduate studies in either political science or philosophy.

SOCIAL STUDIES TEACHER EDUCATION

A major in political science may also choose a Teacher Education Option. This is a 124-credit-hour degree program which includes the normal 30-hour major plus the required professional education courses. Successful completion of the program leads to certification to teach social studies in the secondary schools. Enrollments may be limited in Teacher Education Option programs.

BACHELOR OF SCIENCE IN POLITICAL SCIENCE

The major requirements for a B.S. degree in political science are identical to the B.A. except that 27 hours of course work in the discipline are required instead of 30.

MINOR IN POLITICAL SCIENCE

The Minor in Political Science requires 15 hours of political science courses with grades of C- or better and a minimum GPA of 2.000; nine hours must be at the 300-level or above, including a 400-level seminar; coursework must be drawn from at least two of the following subfields (Pair A: American Politics/Policy and Administration; Pair B: International or Comparative Politics; Pair C: Political Theory/Social Science Methods).

SOCIAL WORK PROGRAM, DIVISION OF MULTIDISCIPLINARY STUDIES

www.ncsu.edu/chass/socialwork/

1911 Building, Room 231
Phone: (919) 515-2492

L.R. Willliams, *Interim Director*
C.E. Waites, *Coordinator of Advising*

Associate Professor Emeritus: I.E. Russell; *Assistant Professors:* M.J. Macgowan, C.E. Waites; *Lecturer:* L.R. Williams; *Adjunct Instructors:* A. Burch, D. Courtney, E. Cummings, P. Denning, M. Deyampert, W. Dubrick, J. Haire, C. Terwilliger.

The Social Work Program is fully accredited by the Council on Social Work Education and offers the Bachelor of Social Work (BSW) degree. Students complete a curriculum based on the liberal arts that incorporates a professional foundation, including social work practice, human behavior, diversity, community social services, social policy, and research methods. Optional courses offer opportunities to study in depth various social work practice areas such as child welfare, health care, black family, and school social work. Students complete several preprofessional placements and a 480-hour field placement in a social service setting. A minor in Social Work is available.

The purpose of the Social Work Program is to prepare students for entry-level professional practice in social work or for advanced graduate-level academic work. The curriculum has a liberal arts base which includes English, literature, history, natural science, math, foreign language, philosophy, social sciences, physical education and free electives. Thirty-five hours of core social work courses, 3 hours of social work electives, and 3 hours of statistics complete the 124-hour graduation requirement. Enrollment in practice and field classes is limited to social work majors, and no credit towards the social work degree is given for student life experiences.

OPPORTUNITIES

Social work is an exciting, challenging, and dynamic profession. No matter what the political climate or the changing nature of personal or social need, social workers will be in demand. Social workers are employed in a variety of settings which include health care, mental health, services to the aging, child welfare, public welfare, substance abuse, public schools, developmental disabilities, and many other public and private settings.

In each of these areas there is recognition for professional preparation, and the BSW graduate will be prepared to embark upon a career in his or her chosen field. All states, including North Carolina, have licensing or certification procedures for social work practice. Graduation from the Social Work Program makes the student eligible for such licensing or certification.

MINOR IN SOCIAL WORK

The minor is designed to familiarize students with the social service system, major social welfare programs, and elements of the profession of social work. The student takes four required courses and selects two additional courses from elective offering which represent the contribution of professional social work in a number of settings.

STUDENT ORGANIZATIONS

Student Social Work Association (SSWA) is open to all social work majors and provides an opportunity for students to socialize and become involved in the professional community outside the school through a wide variety of campus and community activities and aids in maintaining a sense of unity and purpose among the students.

Student Association of Black Social Workers (SABSW) provides students with peer support, a chance to socialize with other social work majors, to process educational material, and examine how the curriculum fits the needs of African American social work majors and social work agencies in the community.

Phi Alpha Honor Society is a national honor society for social work students. A student is eligible for membership after achieving national and local chapter requirements which include having sophomore status, achieving a 3.000 overall grade point average and a 3.250 grade point average in required social work courses, and completing 9 hours of social work courses.

Student Organization of Christian Social Workers provides students with the opportunity to glorify God through the profession of social work and to learn how, as Christians, to work in the field of social work. The organization promotes the open discussion of potential ethical dilemmas that may arise when Christian and secular viewpoints conflict.

ADMISSION TO THE PROFESSIONAL DEGREE PROGRAM

The social work faculty is committed to helping all entering students evaluate career goals and objectives to ensure that the students meet minimum academic standards; have goals and objectives compatible with the major; and know specifically what the profession of social work is in terms of its philosophy, value base, and fields of practice. The admissions procedure is intended to strengthen the student's certainty regarding career choice and to enhance the student's focus and sense of purpose in curriculum planning. Specific components of the admissions procedure include: completion, with a grade of C or better, of any 200-level social work course; participation in an orientation session; completion of the application for admission; a personal interview may be scheduled with a faculty advisory committee. The program is committed to assuring that adequate resources and support services are available to meet the educational needs of students; therefore, admission decisions will be made twice a year on a space-available basis within an established faculty:student ratio. The Social Work Program Student Handbook spells out further details of this procedure, as well as other elements of the Social Work Program.

CURRICULUM IN SOCIAL WORK

Degree earned: Bachelor of Social Work

FRESHMAN YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
SW 201 Community Social Services	3	SW 290 Devel. of Soc. Welfare and Soc.Work	3
ENG 111 Comp. & Rhetoric	3	ENG 112 Comp. & Rhetoric	3
FL_201 Foreign Language [1]	3	History[6]	3
Mathematics	3	Math.[5]	3
SOC 2__[3]	3	Philosophy[7]	3
Any 100-level PE in Fitness & Wellness [2]	1	Physical Education Elective	1
	16		16

SOPHOMORE YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
SW 410 Multicultural Social Work *or*		SW 307 Social Welfare Programs and Policy	3
SOC 305 Race and Enthnic Relations	3	SW 310 Human Behavior for Social Work	3
Natural Science[9]	4	Literature[8]	3
ANT 252 Cultural Anthropology	3	Natural Science[9]	4
PSY 200 Intro. to Psychology	3	PS/EC 2__[3]	3
Literature[8]	3		16
	16		

JUNIOR YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
Social Work Elective	3	*SW 320 Social Work Practice I	3
ST 311 Intro. to Statistics	3	SW 300 Social Work Research Methods *or*	3
History	3	SOC 300 Research Methods	4
Natural Science[9]	3	ANT or SOC 3__/4__[3]	3
Sci., Technology & Soc.[10]	3	Free Elective	3
Free Elective	2	Free Elective	3
	17		15/16

SENIOR YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
*SW 405 Social Work Practice II[4]	3	*SW 490 Field Work in Social Services	12
SW 420 Legal Aspects of Social Work[4]	3		
*SW 480 Preparation for Fieldwork[4]	1		12
Free Elective	3		
Free Elective	3		
Free Elective	3		
	16		
		Minimum Hours Required for Graduation	**124**

*Practice and Field Courses must be taken in successive semesters. Field Work is offered in both Fall and Spring semesters, but must be taken during the last semester. Preparation for Field Work is a corequisite of SW 405 Social Work Practice II.

[1]Demonstrated proficiency at the first-semester intermediate level (FL_ 201) in a foreign language. In order to enroll at the 201 level, prerequisites must be met through course work or the Placement Test.

[2]Any 100 level PE Fitness & Wellness course and one additional 1 credit PE course is required for graduation.

[3]The fifteen-hour social science requirement of the College of Humanities and Social Sciences includes ANT 252; one 200-level SOC course; one 300-or 400-level ANT or SOC course; PSY 200 and a basic course in political science or economics.

[4]The Bachelor of Social Work consists of 46 hours in the major including the twelve hours of fieldwork (SW 490). Practice and Field Work courses must be taken in successive semesters. SW 490 is scheduled in both fall and spring semesters but must be taken during the student's last semester.

[5]Two mathematics courses (6 hours credit) are required.

[6]This two-semester requirement includes a course concerned with pre-industrial Western or non-Western societies (HI 207, 208, 209, 215, 216, 263, 264, 270, 275, or 276), and another dealing with the United States or post-industrial Western societies (HI 205, 210, 221, 222, 233, 251, or 252).

[7]Three hours of philosophy, exclusive of logic (LOG 201 and 335), are required.

[8]This requirement consists of two literature courses, at least one of which must be in literature outside the United States and prior to the twentieth century. One of the courses must come from the following: ENG/FL 221, ENG/FL 222; ENG 251*, ENG 261*, ENG 262*; FLF 301; FLS 301; FLS 303; FLG 316; or FLR 303. The second course may also come from the list above or it may be a course in American or twentieth century literature (either ENG/FL 223, ENG/FL 224; ENG 246, ENG 248, ENG 252, ENG 265, ENG 266; or FLR 304), or it may be an upper-division survey course or literature course in a period, genre or major figure in English, a foreign language in English translation, or the original foreign language (either ENG 305, 349, 362, 363, 369, 370, 371, 372, 373, 376, 377, 380, 382, 383, 385, 390, 398, 399, 420, 439, 448, 449, 451, 452, 453, 462, 463, 464, 465, 468, 469, 470, 471, 486, 487; ENG/FL 394, 406, 407; FLF 302, 320, 323, 324, 330, 352, 414, 415, 492; FLG 323; FLS 302, 304, 323, 403, 404, 492; or GRK 320). *Students using ENG 261 or ENG 262 to satisfy this requirement may not also use ENG 251. *Students using ENG 261 or 262 to satisfy this requirement may not also use ENG 251.

[9]The natural science requirement calls for a minimum of eleven credit hours; at least one human-oriented science is required - preferably BIO 105, 125, 181, 183 or ZO 212; students must receive credit from two different basic introductory courses in physics, chemistry, the earth sciences, and the biological sciences; the third course may be either GN 301 or FS/NTR 301; at least two courses must include a laboratory experience.

[10]One three-credit course taken from the university approved lists of courses in Science, Technology and Society (Humanities and Social Sciences Perspectives list or Science and Technology Perspectives list). The course used to meet this requirement may not be used to fulfill any other requirement.

DEPARTMENT OF SOCIOLOGY AND ANTHROPOLOGY

http://sasw.chass.ncsu.edu/s&a/s&ahmpg.htm

1911 Building, Room 301
Phone: (919) 515-3180

W.B. Clifford, *Head*
E.M. Woodrum, *Associate Head*
R.S. Ellovich, *Undergraduate Administrator*
J.C. Leiter, *Director of Graduate Programs*
S.C. Lilley, *Department Extension Leader*

Sociology Teaching, Research And Extension Faculty

Professors: V.M. Aldige, W.B. Clifford, L.R. Della Fave, T.J. Hoban, J.C. Leiter, R.L. Moxley, L.B. Otto, B.J. Risman, M.M. Sawhney, M.D. Schulman, D.T. Tomaskovic-Devey, R.C. Wimberley, E.M. Woodrum, M.T. Zingraff; *Professors Emeriti:* J.N. Collins, E.M. Crawford, T.N. Hobgood Jr., C.P. Marsh, M.E. Voland, J.N. Young; *Associate Professors:* M.P. Atkinson, R.F. Czaja, S.K. Garber, T.N. Greenstein, S.C. Lilley, P.L. McCall, M.L. Schwalbe, M.E.

Thomas, M.S. Thompson, R.J. Thomson, K.M. Troost, C.R. Zimmer; *Associate Professors Emeriti:* R.C. Brisson, P.P. Thompson; *Assistant Professors:* R.L. Engen, W.R. Smith; *Assistant Professors Emeriti:* C.G. Dawson, T.M. Hyman; *Associate Member of the Faculty:* R.D. Mustian (Agricultural and Extension Education); *Adjunct Associate Professor:* J.R. Thigpen (East Carolina University).

Anthropology Teaching And Research Faculty
Associate Professors: I. Rovner, A.L. Schiller, M.L. Walek, J.M. Wallace; *Associate Professors Emeriti:* G.S. Nickerson, J.G. Peck; *Assistant Professors:* R.S. Ellovich.

The Department of Sociology and Anthropology offers introductory and advanced courses in sociology and anthropology covering the major sub-fields of the two disciplines. It also offers supervised field work and practicum experiences required for certain curricula in the department.

Aims of the departmental offerings are to provide majors with academic background and experience useful for many careers in government and industry or for pursuing advanced academic work (for a description of the graduate degrees offered by the department, see the *Graduate Catalog*) and to provide service courses to other students.

The department, jointly administered by the Colleges of Humanities and Social Sciences and Agriculture and Life Sciences, offers six undergraduate curricula. The four curricula administered by the College of Humanities and Social Sciences are Bachelor of Arts in Sociology, Bachelor of Arts in Sociology with Criminal Justice Option, Bachelor of Arts in Sociology with Social Studies Teacher Education Option, and Bachelor of Arts in Sociology with Anthropology Concentration.

HONORS PROGRAM
In this program, outstanding majors pursue an individual program of study involving close working relations with departmental faculty. Twelve credit hours of honors courses will allow students to enhance their expertise in sociology and anthropology. Honors courses combine nine hours of credit in regular and independent study classes with a three-credit honors thesis done in consultation with a faculty honors advisor.

To be admitted, students must have earned 12 hours in their major and have a 3.250 overall GPA and a 3.250 in the major. To graduate with Sociology/Anthropology Honors, the student must have a 3.250 GPA overall and in the major. Successful completion of the program is noted on the student's transcript and diploma and at commencement.

BACHELOR OF ARTS IN SOCIOLOGY
The following departmental requirements must be met by all students majoring in sociology: A minimum of 31 hours in the major field including SOC 300, Social Research Methods; SOC 400, Theories of Social Structure; SOC 401, Theories of Social Interaction; at least three but no more than six credit hours of 200-level sociology courses; at least 15 credit hours of 400-level or above sociology courses including SOC 400 and SOC 401. (Note: In the LCS program [anthropology concentration], 3 credit hours at the 400-level or above are in anthropology.) Additional electives in sociology may be at the 300-level or above. ANT 252, Cultural Anthropology, is required. A second course in anthropology is strongly recommended. ST 311, Introduction to Statistics, is also required.

CRIMINAL JUSTICE OPTION
The Criminal Justice Option seeks to develop a professional orientation that will be relevant both to occupational goals and participation as a citizen in community affairs. Courses in both political science and sociology are included in a 25-block that provides general background in crime specific courses dealing with deviance, juvenile delinquency. the court system, correctional facilities, and the like, including field placement in an agency of criminal justice system.

SOCIAL STUDIES TEACHER EDUCATION OPTION
This curriculum prepares the student for state certification in social studies in the secondary school system. (125 hours required for graduation). The inclusion of a professional semester with practice teaching and the need for a broad base in the social sciences makes this a comparatively demanding program. Courses in education and psychology are taken beginning in the sophomore year in preparation for the teaching experience. The student learns the basic concepts of economics, political science, anthropology and history, as well as sociology. Enrollments in Teacher Education Option programs may be limited.

ANTHROPOLOGY CONCENTRATION
This concentration emphasizes the complementary nature of sociology and anthropology in understanding human behavior in social and cultural context. It encourages flexibility in selection from both anthropology (12 hours within the major plus 6 hours in the social science requirement) and sociology (22 hours) courses. The four anthropological subdisciplines of cultural anthropology, physical anthropology, archaeology, and linguistics are represented in the course offerings.

MINOR IN ANTHROPOLOGY
A minor in Anthropology focuses on the comparative study of human beings, with emphasis on biology and behavior. A flexible selection of courses (15 credit hours) includes offerings from anthropological subdisciplines of cultural anthropology, physical anthropology, archaeology, and linguistics.

MINOR IN SOCIOLOGY
This minor emphasizes sociological theory and research with substantive applications. The minor builds on theory and methodology and allows students flexibility in the choice of specialties such as criminology, stratification, race and ethnic relations, agriculture, development, work and organization, or the family.

COLLEGE OF MANAGEMENT

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J. W. Bartley, *Interim Dean*
G. J. Zuckerman, *Interim Associate Dean for Academic Affairs*
J. M. Busko, *Coordinator of Career Services*
E. O. Dixon, *Director of Admissions*
G. A. Hankins, *Director of Academic Affairs*
A. L. Irby, *Director of Advising*
A. F. Nowel, *Director of Student Services*
D. R. Steen, *Director of Computing Services*

MISSION
The mission of the College of Management is to provide the citizens of North Carolina high quality education in accounting, business management and economics; to produce distinguished research and publications; and to provide high quality executive education and outreach programs. The College's undergraduate and graduate degree programs are the core of its mission and are distinguished by their excellence and their emphasis on the management of technology and those aspects of management that interface with the other technical and professional disciplines at North Carolina State University.

VISION
The College of Management will be recognized for excellence in management education, for its emphasis on the management of technology and for its unique dual-degree and cross-disciplinary programs with other colleges at North Carolina State University.

The College of Management offers a variety of curricula that prepare graduates to become leaders in a global business environment. Students may prepare for careers in fields such as accounting, electronic commerce, financial management, manufacturing management, marketing, sales, economic analysis, human resource management, quality management, management information systems, and general management. Opportunities for employment include corporations, consulting and public accounting firms, government agencies, and non-profit organizations. Many graduates pursue advanced studies in law, professional accounting, economics and business administration.

The curricula provide all students with a broad liberal arts background combined with a strong concentration in accounting, business, and economics. Communication skills and computer usage are stressed throughout the course work. The College faculty are dedicated to excellence in teaching and research. An outstanding faculty combined with innovative curricula provide students with the opportunity to acquire the basic knowledge and management skills necessary to become leaders in the business world. Many courses are offered in the evening as well as the day and provide part-time educational opportunities to employed adults.

The three departments in the College, Accounting, Business Management, and Economics, graduate more than 500 students annually. Four undergraduate degree programs are offered: B.S. in Accounting, B.S. in Business Management, and B.A. and B.S. in Economics. The accounting and business management degrees are professionally oriented while the economics degrees are both liberal arts degrees. New freshmen and transfer students with fewer than 40 hours of college credit may enter an Undeclared Major in the College. After completing 40 credit hours, students in the Undeclared major enter a degree program. Graduate degrees offered include: Master of Accounting, Master of Economics, Master of Science in Management, and Ph.D. in Economics.

The Alexander Hamilton Scholars Program is a dual degree program sponsored jointly by the College of Management and the College of Humanities and Social Sciences at North Carolina State University. The program is designed for undergraduate students wishing to complement a management degree with a strong emphasis on international studies. For further information, contact Dr. John Dutton, program Co-Director, at 515-6948.

Students may pursue a dual degree program in which they receive both a B.S. in Chemical or Electrical Engineering and M.S. in Management. For further information contact the College of Engineering.

ACADEMIC MINORS:
Academic minors for students in other majors are offered in accounting, business management, and economics.

STUDENT ACTIVITIES
There are two honor societies: Sigma Beta Delta for accounting and business management majors and Omicron Delta Epsilon for economics majors. Students also have the opportunity to join many management related organizations including the Accounting Society, Alpha Kappa Psi (professional business fraternity), American Advertising Federation, College of Management Advisory Board, Economics Society, Entrepreneur's Club, National Association of Black Accountants, Pre-Law Student Association, Society for African-American Corporate Leaders, and the Society for Human Resource Management. These organizations sponsor social events and hold regular meetings where business leaders discuss current issues and provide career advice.

FACILITIES
The College of Management is located in Nelson Hall. A large computing lab in Nelson Hall provides students access to multimedia personal computers served by a local area network and linked to the Internet. All of the College's primary classrooms are equipped for multimedia presentations.

STUDENT SERVICES
The College of Management provides comprehensive academic advising services to undergraduate students. New freshmen and off-campus transfer students are assigned to specialized advisors. All students have access to a faculty advisor and to the College's professional advising staff located in the Academic Affairs Office, Nelson Hall.

SCHOLARSHIPS
In addition to university-wide awards, the College has the following scholarships: the Brantley and Geri Deloatche Scholarship, the E.C. Hunt, Jr. Endowment, the First Union Undergraduate Scholarship Award, the Lichtin Family Scholarship, the Robert L. Shaw Memorial Scholarship in accounting, and R. Ray Moore Scholarship available to rising juniors and seniors majoring in business management and economics. The College contacts all applicants for admission who may be eligible for scholarships.

DEPARTMENT OF ACCOUNTING

www.mgt.ncsu.edu

Nelson Hall
Phone: (919) 515-2256

C. J. Messere, *Head*
R. L. Peace, *Director of Graduate Programs*

Alumni Distinguished Undergraduate Professor: R.L. Peace; *KPMG Peat Marwick Professors:* C.J. Messere; *Profesors:* J.W. Bartley, R.L. Peace, P.F. Williams; *Associate Professors:* B.C. Branson, F.A. Buckless, A.Y. Chen, K.A. Krawczyk, R. B. Sawyers, L.M. Wright, G.J. Zuckerman; *Assistant Professors:* M. S. Beasley, B.A. Chaney, L.R. Ingraham, J.G. Jenkins, D. P. Pagach; *Lecturers:* E. R. Carraway, J. W. Giles, H. O. Griffin, W. A. Koole, G. A. Marsh.

The accounting program provides education and training to individuals who will pursue careers as professional accountants in business, government, and industry. The Department of Accounting currently offers a Bachelor of Science degree in accounting. In order to meet the demands of employment markets for more highly skilled accounting professionals and respond to the American Institute of Certified Public Accountants' mandated 150-hour education requirement by the year 2000, the Department of Accounting also offers a fifth-year Masters of Accounting (MAC) degree program.

OPPORTUNITIES
Accounting systems and the accountants who maintain them are absolutely essential to the functioning of business enterprises of all types and sizes, to government at all levels; and to nonprofit organizations. Many career opportunities are available to accounting graduates. Starting salaries are among the highest of all university graduates, and potential earnings over a lifetime are excellent.

The accounting profession is organized into three major employment groups:

- approximately 60 percent of accountants are employed in business entities;
- another 10 percent work in non-business entities;
- about 30 percent are in public practice.

Public accountants offer auditing, tax preparation and planning, and management consulting to individuals, businesses, and other organizations on a fee basis. Management or industrial accountants design financial and cost accounting systems and provide their companies with financial management, financial analysis, planning and budgeting, product costing, and operational auditing. Governmental units and other not-for-profit entities have informational needs similar to private businesses. Accountants employed by such entities perform many of the same functions. Accountants in some governmental agencies, such as the SEC, IRS, and FBI, serve the dual function of auditing and law enforcement.Certified public accountants (CPAs), certified management accountants (CMAs), certified internal auditors (CIAs) and certified cost analysts (CCAs) are individuals who, like doctors, dentist, and lawyers, are licensed to practice their profession. Such certifications are granted to those accountants who pass a qualifying examination and meet certain accounting experience and educational requirements.

SCHOLARSHIPS AND AWARDS
Approximately ten achievement awards sponsored by businesses and public accounting firms are made to outstanding students annually.

HONORS PROGRAM
Designed for academically talented and highly motivated students seeking a richer educational experience. Students can expand their understanding of accounting's role in society and investigate accounting problems and issues in greater depth. The instructional environment gives students opportunities to develop critical thinking, problem-solving and communication skills. Students will be better prepared for entry into graduate programs and employment possibilities.

Admission Requirements:
Completion of 30 hours of course work at NC State with at least a 3.250 overall GPA.

Graduation Requirements for Honors:
Students must achieve at least a 3.250 overall GPA and at least a 3.250 GPA in all honors courses completed.

Honors Coursework:

- 12 credit hours of honors course work minimum required. *The 12 hours of honors course work must contain courses from at least two of the following categories: Special courses, advanced courses and independent study.*
- In their senior year, all honors students must take either a regularly scheduled honors section of ACC 490 or a student-initiated honors option in ACC 490. ACC 490 will include a major project and/or a small group tutorial that meets the Honors Program requirement for "independent study."

Remaining 9 hours credit must be selected from among the following categories:
1. Honors sections of any 300- or 400-level ACC courses
2. Student or faculty initiated honors options in any 300- or 400-level ACC course
3. Honors credit through honors section, student initiated honors option, or faculty initiated honors option in any EC or BUS course (no more than 3 credit hours from EC or BUS courses may count towards the remaining 9 credit hours.)
4. Advanced courses: 500-level MAC courses taken as elective courses or as substitutes for 300- or 400-level courses, subject to approval by the Honors Program Director.

CURRICULUM AND DEGREE REQUIREMENTS
All Accounting majors graduating after Summer II 1997 are subject to a departmental residency requirement that they complete a minimum of 30 credit hours of course work at NC State after being formally admitted to the B.S. degree program in Accounting (or the B.S. in Business Management). In addition, Accounting majors must complete at least 30 hours of major courses and at least six of the following courses in residency at NC State: ACC 310, 311, 320, 330, 410, 450, and 490. A "General Policies" statement for all College of Management majors is available in Nelson Hall. It serves as an addendum to the curriculum requirements and describes GPA requirements for graduation, residency requirements, suspension policy, required grades in specific courses, course repeat policy, etc.

CURRICULUM IN ACCOUNTING
Degree earned: B.S. in Accounting

FRESHMAN YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
ACC 100 Intro. Accounting Profession	1	COM 110 Public Speaking or	
ENG 111 Comp. & Rhetoric[1]	3	COM 146 Business Comm.	3
MA 121 Elements of Calculus[2]	3	ENG 112 Comp. & Reading[1]	3
History Elective[3]	3	M 200 Micro. Applic. Bus. Accounting	1
Natural Science Elective[4]	4	MA 132 Comp. Math for Life & Mgmt. Sci.	1
Any 100-level PE in Fitness & Wellness[12]	1	Humanities/Soc.Sci. Elective[3]	3
	15	Natural Science Elective[4]	3
		Physical Education Elective[12]	1
			16

SOPHOMORE YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
ACC 210 Accounting I	3	ACC 220 Accounting II	3
BUS 201 (295B) Intro. Bus. Processes	3	BUS 335 Organizational Behavior	3
EC 201 Prin. of Microecon.	3	BUS/ST 350 Economics/Bus. Stat.[5]	3
MA 114 Intro. to Finite Math[2]	3	EC 202 Prin. of Macroecon.	3
PSY 200 Intro. to Psychology	3	Ethics Elective[6]	3
	15		**15**

JUNIOR YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
ACC 310 Intermediate Financial Account.[1]	3	ACC 300 The Accounting Profession[9]	1
ACC 320 Managerial Uses of Cost[7]	3	ACC 311 Intermed. Fin. Accounting II[7]	3
BUS 370 Operations Mgmt.	3	ACC 330 Intro. to Income Tax[7]	3
ENG 33x[8] Advanced Writing Elective	3	BUS/CSC 340 Info. Systems Mgmt.	3
Restricted Elective[9]	3	Sci., Technology, and Soc. Elective[4]	3
	15	Restricted Elective[10]	3
			15-16

SENIOR YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
ACC 410 Government & Special Repot Issues	3	ACC 300 The Accounting Profession[9]	1
ACC 440 Accounting Information Systems[7]	3	ACC 407 Business Law	3
BUS 320 Financial Mgmt.	3	ACC 450 Auditing Fin. Info.[7]	3
BUS 360 Marketing Methods	3	ACC 490 Senior Seminar	3
Literature Elective[3]	3	College of Mgmt. Elective[11]	3
	15	Restricted Elective[10]	3
			15-16

Minimum Hours Required for Graduation: 122

[1]"Cs" or better in both ENG 111 and 112 (or ENG 112-H) are required.
[2]MA 131 and 132 or 141 may substitute for MA 121. MA 242 may substitute for MA 114.
[3]One course from among the History, Literature, and H & SS electives must focus on a non-English speaking culture.
[4]Three courses (11 hours) from natural sciences; 8 hours of Basic Natural Science and 3 hours from the Science, Technology, and Society (STS) elective list.
[5]ST 361, or 372 may substitute for BUS 350.
[6]One of the following courses in ethics: PHI 275, 311, 313, 314, 321, or 322. (PHI 311, 313, and 322 have prerequisite.)
[7]COURSES REQUIRING C- PREREQUISITES:
Course Prerequisites
ACC 310 C- or better in ACC 210
ACC 311 C- or better in ACC 310
ACC 320 C- or better in ACC 220
ACC 330 C- or better in ACC 210
ACC 410 C- or better in ACC 310
ACC 440 C- or better in ACC 310, and ACC 320
ACC 450 C- or better in ACC 311
[8]ADVANCED WRITING ELECTIVE - Select one of the following: ENG 331 Communication for Engineering and Technology, ENG 332 Communication for Business Mgmt, or ENG 333 Communication for Science and Research
[9]Prospective MAC candidates should enroll in ACC 300 during the spring semester of their Senior year. Those students not planning to enroll in the MAC program should take ACC 300 during the spring semester of their Junior year.
[10]Nine hours of restricted electives are required. These electives *may not* be ACC or BUS courses. One of the three courses may be EC. Credit will not be allowed for FL 101, 102, or 105 (in language in which proficiency requirement is met), and MA 101, 103, 105, 107, 108 and 111.
[11]This course must be in a 400-level BUS or ACC course or a graduate-level ACC course taken for undergraduate credit.
[12] PEC, PEF, PEH, PEO and PES courses cannot be taken to satisfy this requirement. PE courses may be taken for credit only.

MINOR

The accounting minor is offered to students interested in gaining a basic knowledge of accounting and an understanding of how accounting information is used to make rational decisions by individuals, businesses, and society. The minor requires 15 hours of accounting courses and includes an introduction to financial, managerial, and tax accounting principles and practices. The minor is not intended to prepare students for a professional accounting career. Please contact the Academic Affairs office in Nelson for specific information about admission and other requirements.

DEPARTMENT OF BUSINESS MANAGEMENT

Nelson Hall
Phone: (919) 515-5567
www.mgt.ncsu.edu

S. Barr, *Department Head*
S. G. Allen, *Director of Graduate Programs*

Alumni Distinguished Undergraduate Professors: J.P. Huggard, C.B. Kimbrough, J.W. Wilson;*Professors:* S.G. Allen, S.Barr, R.L. Clark, G. W. Dickson, C.P. Jones, R.J. Lewis, M.A. Rappa, J.W. Wilson; *Professors Emeriti:* A.J. Bartley, D.R. Dixon; *Associate Professors:* D.L. Baumer, C.C. Bozarth, S.N. Chapman, K.S. Davis, J.C. Dutton, S.K. Markham, E.A. McDermed, K. Mitchell, P. Mulvey, A. Padilla, J.C. Poindexter, Jr.;*Assistant Professors:* L. Aiman-Smith, J.B. Earp, J.K. McCreery, M. Montoya-Weiss, F.C. Payton, K.D. Schenk, S.E. Scullen, B.B. Tyler, G. Voss, G. Young;*Lecturers:* J.P. Huggard, J.P. Jeck, C.B. Kimbrough. *Associate Members of the Faculty:* A. Kingon, M.E. Kurz, M. Zapata.

The Department of Business Management offers a Bachelor of Science degree in business management that prepares students for careers in business, government or nonprofit organizations and for graduate study in business, law, and related fields. The curriculum offers a broad professional education in a variety of business fields such as finance, human resources, marketing, management information systems, and operations/production management. Career opportunities are available in areas such as retailing, banking and financial services, high tech manufacturing, transportation, consulting, and government agencies.

The Bachelor of Science degree in business management consists of a broad foundation of humanities, social science, science and mathematics; a comprehensive business core; and a concentration in a functional business area. The program emphasizes management in a highly competitive global economy. Students develop strong communication skills and learn to work in teams. Many courses prepare students to use information technology and computers. Required courses in the major include accounting, economics, communications, business writing, legal environment of business, computer science, finance, marketing, organizational behavior, quantitative methods, operations management, and business strategy. Business management students also complete a three-course business concentration.

CURRICULUM DEGREE REQUIREMENTS

All Business Management majors graduating after Summer II 1997 are subject to a departmental residency requirement that they complete a minimum of 30 credit hours of course work at NC State after being formally admitted to the B. S. degree program in Business Management (or the B.S. in Accounting). In addition, Business Management majors must complete at least 30 credit hours of the major course requirements of the degree while in residency at NC State. A "General Policies" statement for all College of Management majors is available in Nelson Hall. It serves as an addendum to the curriculum requirements and describes GPA requirements for graduation, residency requirements, suspension policy, required grades in specific courses, course repeat policy, etc.

CURRICULUM IN BUSINESS MANAGEMENT

Degree earned: B.S. in Business Management

FRESHMAN YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
BUS 100 Intro. to COM	1	ENG 112 Comp. & Reading[1]	3
ENG 111 Comp. & Rhetoric[1]	3	M 200 Micro. App. Bus. Accounting	1
MA 121 Elements of Calculus[1,4]	3	MA 132 Comp. Math for Life & Mgmt. Sci.	1
History Elective[2]	3	Natural Science[5]	4
Natural Science Elective[5]	4	Communication[3]	3
Any 100-level PE in Fitness & Wellness[12]	1	Free Elective[10]	3
	15	Physical Education Elective[12]	1
			16

SOPHOMORE YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
ACC 210 Accounting I	3	ACC 220 Accounting II	1
BUS 201 (295B) Intro. Bus. Processes	3	BUS/ST 350 Economics./Bus. Stat.[1]	3
EC 201 Prin. of Microeconomics	3	EC 202 Prin. of Macroeconomics	3
MA 114 Intro. to Finite Math	3	FL_102 Inter. Foreign Language	3
PSY 200 Intro. to Psychology	3	Humanities/Soc.Sci. Elective	3
	15		15

JUNIOR YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
BUS 305 Legal & Regulatory Environm.	3	BUS 330 Human Resource Mgmt.	3
BUS 320 Financial Mgmt.	3	BUS 335 Organizational Behavior	3
ENG 33x[11] Advanced Writing Elective	3	BUS/CSC 340 Info. Systems Mgmt.	3
Natural Science[7]	3	BUS 360 Marketing Methods	3
Ethics Elective[6]	3	BUS 370 Operations Mgmt.	3
	15		15

SENIOR YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
Business Concentration	3	BUS 480 Business Policy & Strategy	3
Humanities/Social Science Elective [8]	3	Business Concentration	6
Literature Elective[9]	3	Free Electives[10]	5
Free Electives[10]	6		14
	15		

Minimum Hours Required for Graduation: 120

[1]A grade of "C" or better is required.
[2]Students should select from among the History Electives list.
[3]Select one of the following: COM 110, 112, 146, 211.
[4]MA 131 and 132 or 141 may substitute for MA 121, MA 242 may substitute for MA 114
[5]Students should select from the Natural Science (Basic) List (Biology, Chemistry, Earth Sciences, and Physics).
[6]Students should select from the following: PHI 275, 311, 313, 314, 321, and 322. (PHI 311, 313 and 322 have a prerequisite).
[7]Students should select from the Natural Sciences Elective List, including, but not limited to, Biology, Chemistry, Earth Sciences, and Physics.
[8]One HSS course must be from the Science, Technology, and Society (Humanities and Social Science Perspective) List and the other course can be from the aforementioned list or the Humanitites and Social Sciences Additional List.
[9]Students should select from among the Literature Electives List.
[10]Credit will not be allowed for FL 101, 102, or 105 (in the language in which proficiency requirement is met), and MA 101, 103, 105, 107, 108, and 111.
[11]ADVANCED WRITING ELECTIVE - Select one of the following: ENG 331 Communication for Engineering and Technology, ENG 332, Communication for Business Management, or ENG 333 Communication for Science and Research.
[12] PEC, PEF, PEH, PEO and PES courses cannot be taken to satisfy this requirement. PE courses may be taken for credit only.

HONORS PROGRAM
Open to academically talented and highly motivated students seeking a more thorough preparation for future careers in business.Students are exposed to a richer set of business problems taught in smaller classes by distinguished faculty. Opportunities are provided for students to develop critical thinking, problem solving and communication skills. Students will be better prepared for entry into graduate programs and attractive employment possibilities.
Admission Requirements:
Completion of 30 hours of course work at NC State with at least a 3.250 overall GPA.
Graduation Requirements for Honors:
Completion of 12 credit hours of honors coursework and achievement of at least a 3.25 overall GPA and at least a 3.25 GPA in all honors courses completed.
Honors Coursework:

- 12 Credit hours minimum of honors work is required. *The 12 hours of honors course work must contain courses from at least two of the following categories: Special courses, advanced courses and independent study.*
- In their senior year, all honors students must take either a regularly scheduled honors section of BUS 480, Business Policy and Strategy or a faculty initiated Honors option in BUS 480. The honors BUS 480 will include a major project and /or a small group tutorial that meets the Honors Program requirement for "independent study."

9 credit hours of honors course work must be selected from the following categories:
1. Honors sections of 300- or 400-level BUS courses (special courses).
2. Faculty initiated honors options in 400-level BUS concentration courses (special courses).
3. Subject to approval of the Honors Program Director, 500-level MSM (daytime) courses taken as substitutes for required courses or as electives (advanced courses).
4. Maximum of one honors section (3 credit hours) in any 300- or 400-level ACC or EC course (special course).

MINOR IN BUSINESS MANAGEMENT
The Department of Business Management offers a minor in Business Management to undergraduates other than those majoring in the B.S. degree in Accounting (ACC). Students majoring in Textile and Apparel Management (TXT) or Agricultural Business Management (ABM) must meet the standard course requirements for the Business Management Minor including at least three courses (9 credit hours) that are not required courses for their major (or part of a list of alternative courses that meet a major requirement).

DEPARTMENT OF ECONOMICS

www.mgt.ncsu.edu

328 Nelson Hall
Phone: (919) 515-3274

S.E. Margolis, *Head*
W. N. Thurman, *Director of Graduate Programs*

Alumni Distinguished Undergraduate Professor: J.S. Lapp, M. B. McElroy; *Professors:* S. G. Allen, R. L. Clark, E. W. Erickson, D. Fisher, D. J. Flath, T. J. Grennes, A. R. Hall, D. M. Holthausen, D. N. Hyman, C. R. Knoeber, S. E. Margolis, R. B. Palmquist, D. K. Pearce, J. J. Seater, W. N. Thurman, W.J. Wessels; *Adjunct Professor:* J. B. Hunt, Jr.; *Professors Emeriti:* R. M. Fearn, B. M. Olsen, C. B. Turner; *Associate Professors:* D. S. Ball, L. A. Craig, A. E. Headen, J. S. Lapp, M. B. McElroy, C. M. Newmark; *Assistant Professors:* A. P. Levy, T. C. Tsoulouhas; *Associate Member of the Faculty:* D. A. Dickey (Statistics).

The Department of Economics offers Bachelor of Arts and Bachelor of Science degrees in economics. An undergraduate program in economics prepares a student for a career in business or government as well as for graduate and professional schools. Economics students can develop their understanding of economic issues in a variety of areas, including financial institutions, international trade and finance, labor and industrial relations, health care economics, industrial organization, environmental and natural resource economics, public finance, and economic history. An economics degree is attractive to employers because it provides a rigorous analytical training with a broad understanding of the workings of the economic system. Its flexibility also allows students to tailor their education to specific interests and career goals. An undergraduate degree in economics has long served as the foundation for advanced professional degrees in business and law, as well as for graduate study in economics.

HONORS PROGRAM
The Honors Program in Economics is designed for academically talented and motivated students who desire a richer educational experience than offered in regular courses. The primary goal of this program is to help students develop the ability to apply economic analysis to issues involving choice at the individual, household, firm and government level. Admission to the program requires junior standing, completion of a least 30 hours at NC State with a 3.000 GPA, and grades of B or better in EC 201, 301, and 302. To graduate with honors in economics, a student must have at least a 3.250 overall GPA and 3.250 or better in all economics courses taken at NC State. In addition, the student must take the Honors Seminar (EC 490H) and the honors section of at least two of the following courses: EC 201, EC 301, EC 302 or a faculty-initiated Honors Option EC course.

CURRICULA
The Bachelor of Arts in economics is a broad and flexible program of study. The major course work for the Bachelor of Arts in economics includes 12 semester hours of economic theory and 14 hours of mathematics, statistics, and computer science. In addition, students study at least 18 semester hours of

advanced, applied economics. The program provides for substantial flexibility so that students, in consultation with their faculty advisors, may tailor their studies to their particular interests and long term objectives.

The Bachelor of Science in economics puts particular emphasis on training in analytical methods in economics. It differs from the Bachelor of Arts by having less emphasis on the liberal arts and greater emphasis on courses in mathematics, science, and statistics. A "General Policies" statement for all College of Management majors is available in Nelson Hall. It serves as an addendum to the curriculum requirements and describes GPA requirements for graduation, residency requirements, suspension policy, required grades in specific courses, course repeat policy, etc.

CURRICULUM IN ECONOMICS
Degree earned: B.A. in Economics

FRESHMAN YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
ENG 111 Comp. & Rhetoric[1]	3	ENG 112 Comp. & Reading[1]	3
MA 121 Elements of Calculus[2]	3	MA 132 Comp. Math for Life & Mgt.	1
FL_201 Inter. Foreign Language[3]	3	MA 114 Intro. to Finite Math.[5]	3
Natural Science[4]	4	History[5]	3
M 200 Micro. Applic. BUS Accounting	1	Natural Science[4]	4
Any 100-level PE in Fitness & Wellness	1	Physical Education Elective[16]	1
	15		**15**

SOPHOMORE YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
CSC 200 Introduction to Computers	3	EC 202 Prin. of Macroeconomics	3
EC 201 Prin. of Microeconomics or		Phil., Relig., Vis/Perf. Arts Elective[8]	3
EC 205 Fundamentals of Econ	3	Literature[7]	3
History[5]	3	Natural Science[4]	4
Literature[7]	3	Free Elective	3
Social Science[6]	3		**16**
	15		

JUNIOR YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
BUS/ST 350 Economics Bus. Stat.[10]	3	EC 302 Intermed. Macroeconomics	3
EC 301 Intermed. Microeconomics	3	Advanced Comm.[13]	3
Advanced Writing[11]	3	Advised Elective[14]	3
Sci., Technology, and Soc. Elective[9]	3	Economics Electives[12]	6
Social Science[6]	3		**15**
	15		

SENIOR YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
EC 490[15]	3	Advised Electives[14]	6
Advised Electives[14]	6	Economics Electives[12]	6
Economics Elective[12]	3	Free Electives	2
Free Elective	3		**14**
	15		

Minimum Hours Required for Graduation: 120

[1]"Cs" or better in both ENG 111 and 112 (or ENG 112-H) are required.
[2]MA 131 and 132 or 141 may substitute for MA 121, MA 242 may substitute for MA 114. Students who qualify for MA 131 or 141 are encouraged to take one of these courses.
[3]Proficiency at the first-semester intermediate level (either through successful completion of FL_201 or appropriate placement by the Placement Test) in French, Spanish, German, Russian, Italian, Latin, Classical Greek, Biblical Hebrew, Japanese, Chinese, Portuguese or Swahili is required.
[4]Three courses from the GER Natural Sciences (Biology, Chemistry, Earth Sciences, Physics) list.
[5]Two courses from the GER history list.
[6]Two courses chosen from the following GER lists: Anthropology, Politics and Government, Psychology, Cultural Geography, and Sociology.
[7]Two Courses from the GER Literature list.
[8]One course chosen from one of the following GER lists: Philosophy, Religion, Visual and Performing Arts.
[9]One course from the Science, Technology and Society (Science and Technology Perspective) list.
[10]ST 361, or 372 may substitute for ST/BUS 350. Credit will not be given for more than one of these courses.
[11]Choose from: ENG 331, 332, or 333. Must be taken in JR year.
[12]15 hours of 300 and 400 level EC courses (except EC (ARE) 401) and 500 level ECG courses. No more than 6 hours of 300 level EC courses may be counted as economics electives.
[13]A second course chosen from the GER Advanced writing list or a course chosen from the GER Communication/Speech list.
[14]15 hours chosen from any university course offerings except FL 101, 102, or 105 (in which proficiency requirement is met), or MA 101, 103, 105, 107, 108, or 111, or PE/PEH courses. Students are urged to discuss these courses with their adviser and to consider using these electives to pursue a minor. (NOTE: Certain courses may not be taken in combination with other courses of similar content. SEE CATALOG FOR RESTRICTIONS.)
[15]EC 490H or EC 498 may substitute for EC 490. Students who write a term paper in another EC or ECG course during their senior year may petition to substitute another economics elective for EC 490.
[16] PEC, PEF, PEH, PEO and PES courses cannot be taken to satisfy this requirement. PE courses may be taken for credit only.

CURRICULUM IN ECONOMICS
Degree earned: B.S. in Economics

FRESHMAN YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
ENG 111 Comp. & Rhetoric[1]	3	ENG 112 Comp. & Reading[1]	3
History[4]	3	Natural Science[3]	4
Math[2]	3/4	History[4]	3
Natural Science[3]	4	Math[2]	3 or 4
M 200 Micro. Applic. Bus. Acctg	1	Physical Education Elective.	1
Any 100-level PE in Fitness & Wellness	1		**14/15**
	15/16		

SOPHOMORE YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
EC 201 Prin. of Microeconomics or	3	CSC 200 Intro. to Computers[6]	3
EC 205 Fundamentals of Econ.	3	EC 202 Prin. of Macroeconomics	3
Literature[5]	3	MA 114 Intro. Finite Math[2]	3
Math[2]	3 or 4	Literature[5]	3
Natural Science[3]	4	Natural Science[3]	4
Free Elective	3		**16**
	16/17		

JUNIOR YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
BUS/ST 350 Economics Bus. Stat.[9]	3	EC 302 Intermed. Macroeconomics	3
EC 301 Intermed. Microeconomics	3	Economics Elective[10]	3
Advanced Writing[8]	3	Phil., Relig., Vis/Perf. Arts Elective[8]	3
Natural Science[3]	3 or 4	Sci., Technology, and Soc. Elective[11]	3
Social Science[7]	3	Free Elective	3
	15 or 16		**15**

SENIOR YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
EC 451 Intro. Econometrics	3	EC 490 Res. Seminar in Economics[13]	3
Economics Electives[10]	6	Economics Elective[10]	3
Free Elective	3	Free Electives[14]	7-10
	12		**13/16**

Minimum Hours Required For Graduation: 120

[1]"Cs" or better in both ENG 111 and 112 (or ENG 112-H) are required.
[2]The mathematics requirement consists of four courses: a two course calculus sequence (either MA 131 and 132 or MA 141; MA 231 or 241); MA 114(MA 214 may substitute); and an elective from the following list (MA 242, 303, 305, 421)
[3]Select five (5) courses from (including at least two different sciences): BO 200; BIO 105 (with 106 lab), 125, 181; CH 101 (with 102 lab), 201 (with 202 lab); MEA 100, 101 (with 110 lab), 102 (with 111 lab), 120 (with 121 lab), 130 (with 135 lab), 200 (with 210 lab); PY 123 or 124 (with 125 or 126 lab), 131, 133, 201, 202, 205, 208, 211, 212; SSC 200; ZO 150, 212. **One of the following two course sequences must be included among the five courses (where labs have separate numbers they are given in parethesis and must be taken)**:(i)CH 101 (102) & 201 (202); (ii) MEA 101 (110) & 102 (111); (iii) PY 201 & 202 or PY 205 & 208 or PY 211 & 212.
[4]Two courses from the GER History list. ***
[5]Two courses from the GER Literature list. ***
[6]CSC 101, 110, or 112 may substitute for CSC 200.
[7]One course chosen from the following GER lists: Anthropology, Politics and Government, Psychology, Cultural Geography, and Sociology. ***
[8]Choose from: ENG 331, 332, or 333. Must be taken in the JR year.
[9]ST 361, or 372 may substitute for BUS/ST 350.
[10]Economics electives may be chosen from 300 and 400 level EC courses (except EC/ARE 401) and 500 level ECG courses. At least 6 hours must be at the 400 or 500 level.
[11]One course from the GER Science, Technology and Society (Humanities and Social Sciences Perspective) list.
[12]One course chosen from the following GER lists: Philosophy, Religion, Visual and Performing Arts.
[13]EC 498 may substitute for EC 490. Students who write a term paper in another EC or ECG course during their senior year may petition to substitute for an extra economics elective for EC 490.
[14]Choose enough free electives to bring total hours to at least 122.
[15] PEC, PEF, PEH, PEO and PES courses cannot be taken to satisfy this requirement. PE courses may be taken for credit only.
*** At least one of these courses must come from the Non-English Speaking Culture list.

MINOR IN ECONOMICS
Open to all undergraduate majors outside the Department of Economics, the minor in economics is designed to give students a basic understanding of economic analysis and involve them in applied work in one or more fields of economics. The minor in economics is an excellent complement to many majors within the university, including political science, statistics, business, accounting, and engineering. To complete the minor in economics students must take EC 205 (or EC 201), EC 301, EC 302, and two additional economics courses at the 300 level or higher for a total of 15 semester hours. Please contact the Academic affairs office in Nelson Hall for specific information about admission and other requirements.

COLLEGE OF PHYSICAL AND MATHEMATICAL SCIENCES

Cox Hall, Rooms 113-122	*Phone:*	*(919)515-7833*
NCSU Box 8201	*Fax:*	*(919)515-7855*
Raleigh, NC 27695-8201	*Internet E-mail:*	*pams@ncsu.edu*

J. L. Whitten, *Dean*
D. L. Solomon, *Assaciate Dean for Academic Affairs*
R. E. Fornes, *Associate Dean far Research*
J. C. Herbert, *Director of Undergraduate Enrollment*
W. P. Hill, *Directar of Student Services/Multicultural Affairs*

The College of Physical and Mathematical Sciences offers programs for students whose interests lie in the basic as well as the applied science and mathematical areas. These programs of study and research are offered at both the undergraduate and graduate levels and can lead to many career opportunities. In addition, the College provides the core science and mathematical education support for the entire university. The College consists of five academic departments: Chemistry, Mathematics, Physics, Statistics and Marine, Earth and Atmospheric Sciences. It jointly administers academic programs in Biochemistry with the College of Agriculture and Life Sciences. The Center for Research in Scientific Computation, the Institute of Statistics, the State Climate Office, the Center for Advanced Electronic Materials Processing, the Center for the Exploration of the Dinosaurian World, the State Climate Office, and the Center for Marine Science and Technology are also associated in whole or in part with the College.

Graduates of the College are in demand and valued for their well-developed analytical thinking and problem-solving skills. They are recruited for technical and administrative positions in industrial research and development laboratories, universities and colleges, non-profit research organizations, and government agencies. A large percentage of the graduates undertake advanced study in medical, law, business, or other professional schools as well as further study leading to the Master of Science and Doctor of Philosophy degrees.

The high school student who enjoys computers, mathematics, chemistry, geology, marine science, atmospheric science, or physics, who has an interest in natural phenomena and their fundamental descriptions, and who hopes to make a difference in the quality of life should consider the career opportunities opened by degrees in the physical and mathematical sciences.

DEGREE PROGRAMS

The College offers undergraduate programs of study leading to the Bachelor of Science degree with majors in chemistry, geology, mathematics, applied mathematics, meteorology, natural resources, environmental sciences, physics, and statistics and the Bachelor of Arts degree with majors in geology, chemistry and physics. In some programs students may choose to highlight their studies with concentrations in compatible disciplines. For example, they may select a marine sciences concentration in physics, chemistry, geology, or meteorology; an earth systems history concentration in geology; an air quality, geology, or statistics concentration in an environmental sciences curriculum; or a marine and coastal resources concentration in a natural resources curriculum.

Curricula within the College have similar freshman years, enabling a freshman to change, without loss of time, from one department to another in the College. A time-limited Physical and Mathematical Sciences Undesignated (PMU) "curriculum" is offered to students who want to major in one of these curricula but have not yet made a decision. Minors are offered in geology, mathematics, meteorology, physics, and statistics.

PRE-MEDICAL SCIENCES

Medical and dental schools as well as many other health-related professional schools have long regarded degree programs in the core physical and mathematical sciences as excellent "pre-professional" curricula. Some professional schools prefer the in-depth knowledge gained by this route over those curricula which offer a cursory view of a variety of topics. For further details, contact Ms. Jennette C. Herbert, Director of Undergraduate Enrollment.

DUAL DEGREE PROGRAMS

Students may wish to earn bachelor's degrees in two fields within the College. Other students may wish to combine a bachelor's degree in the College with one in another NC State college or school. With effective planning, a number of courses can satisfy core, general education, or elective requirements simultaneously in both degree programs. For example, many students choose to pursue simultaneous degrees in mathematics and mathematics education or one the physical sciences and science education.

STUDENT ACTIVITIES

In addition to university-wide extracurricular activities and honor organizations, the College of Physical and Mathematical Sciences has student chapters of the following professional and honor organization: Sigma Pi Sigma (Physics Honors Society); Society of Physics Students; Pi Mu Epsilon (National Mathematical Honorary Fraternity); Society for Undergraduate Mathematics (A Student Chapter of the Mathematical Association of America); Phi Lambda Upsilon (National Honorary Chemical Society); American Chemical Society; National Organization for the Professional Advancement of Black Chemists and Chemical Engineers; Mu Sigma Rho (Statistics Honorary Society); Statistics Club; American Meteorological Society; Society of Mining Engineers/Society of Exploration Geophysicists (Geology Club); National Association of Environmental Professionals (Student Chapter); and the nation's first chapter of the Society of African-American Physical and Mathematical Scientists.

FACILITIES

Faculty and students within the College have access to an extensive array of computational and network services. Extensive use of computers to fulfill the daily task requirements encompasses word processing, electronic mail, information access form the library and Internet, and the use of numerous specialized software tool. The College provides a large number of workstations for use by undergraduate and graduate majors and is a participant in the University's campus-wide workstation network. Individual departments will either utilize these workstations or provide additional platforms for work with discipline specific programs; for example instruction or research in mathematics, statistics, satellite data acquisition and analysis, weather modeling, chemistry, or physics. Additionally, students have access to university facilities for additional workstations, peripherals, and services; there is a fully staffed help desk to assist students with problems that they might encounter. Upon enrolling at the University, students receive personal accounts and are offered an introduction to the computing facilities during their first regular semester on campus. Further there is an extensive set of computer based courses available to the university community to further their understanding of applications packages, operating systems, networking, and other computer skills.

Modern research facilities are also accessible and convenient to students in each department. These range from highly specialized laboratories such as those in solid state physics or nuclear magnetic resonance spectroscopy to state-of-the-art instruments such as X-ray diffractometers and electron spin resonance spectrometers. These laboratories are routinely utilized by advance undergraduates taking part in research programs.

COOPERATIVE EDUCATION, FIELD EXPERIENCE, AND UNDERGRADUATE RESEARCH
The College recognizes the value of career-related work experience to students and encourages its majors to avail themselves of such opportunities whenever possible. That experience may be gained through the university's Cooperative Education Program, department sponsored field experience, academic research, and summer employment. Advisers work with students to develop a plan of study that balances a challenging course load with appropriate extracurricular activities.

ADVANCED PLACEMENT
Well-prepared students entering the College may seek advanced placement in biology, chemistry, computer science, foreign language, history, mathematics, statistics, or physics by passing qualifying examinations.

SCHOLARS PROGRAMS
Academically talented high school seniors may be selected to participate in the College of Physical and Mathematical Sciences Scholars Program. Enriched courses, including chemistry, English, mathematics, and physics, have been developed specifically for program participants. Scholars and honors sections of classes are small, allowing for more intellectually stimulating student-to-student and student-to-faculty interactions. Weekly forum and field trips enrich the educational and cultural experiences of students. Completion of scholars and honors courses and programs is recognized on students' permanent transcripts.

HONORS PROGRAMS
Students taking upper-level courses in their major may, if they have a specified grade point average and recommendation of an upper-level course instructor, be invited to participate in a departmental Honors Program in order to create a are individualized and challenging major academic program. Participants elect to fulfill departmental Honors Program requirements by engaging in research projects and more rigorous courses, often at the graduate level. In appropriate instances students receive graduate credit in the senior year toward the Master of Science degree for their honors work.

Completion of honors courses and programs is recognized on students' permanent transcripts. Departmental Honors Programs are offered in all departments of the College of Physical and Mathematical Sciences (See Chemistry, Marine, Earth and Atmospheric Sciences, Mathematics, Physics, Statistics). For Biochemistry, see College of Agricultural and Life Sciences.

SCHOLARSHIPS
College of Physical and Mathematical Sciences majors may be eligible for a variety of freshman and undergraduate College and departmental scholarships in addition to those administered at the university level. The awards are based on a combination of factors, with a strong emphasis on academic excellence. Some scholarships are renewable for up to four years, and some carry opportunities for significant career-related work experience.

COMMUNITY OUTREACH
The College of Physical and Mathematical Sciences demonstrates its commitment to community outreach primarily through its Science House on the NC State campus. The Science House offers programs for K-12 students and teachers to enhance their understanding of, appreciation for, and involvement in mathematics and the physical sciences. The Science House, located on the Centennial Campus, houses classrooms, laboratories and a teaching resource library. Vans from the Science House carry Science on the Road demonstration programs and teaching laboratory equipment to schools across North Carolina.

TUTORIAL AND AUDIO-VISUAL ASSISTANCE
Most of the departments in the College offer students some form of free tutorial assistance, including regularly scheduled review sessions and Supplemental Instruction (SI) for selected sections of chemistry, mathematics, and physics. Several departments provide facilities for students to use supplementary videotaped or computer-assisted instructional materials on a voluntary basis.

GRADUATE STUDY
The Master of Science and Doctor of Philosophy degrees are available with majors in biomathematics, chemistry, marine, earth and atmospheric sciences, mathematics, applied mathematics, statistics, and physics. The Master of Biomathematics, Master of Chemistry, and Master of Statistics are also offered. The Departments of Statistics, Mathematics and Physics offer BS-MS programs which allow students to enroll in up to twelve credit hours of graduate level course work which may be applied toward the requirements of both the bachelor's and master's degrees.

DEPARTMENT OF BIOCHEMISTRY

(See College of Agriculture and Life Sciences)

DEPARTMENT OF CHEMISTRY

www2ncsu.edu/ncsu/chemistry/chem.html

Dabney Hall, Room 108 and Withers Hall
Phone: (919) 515-2355

B. M. Novak, *Howard J. Schaeffer Distinguished Professor & Head*
C. B. Boss, *Director of Undergraduate Studies*
R. J. Linderman, *Director of Graduate Studies*
R. W. Morrison Jr., *Executive Officer, Scheduling Officer*

Chancellor & University Professor: M.A. Fox, *Glaxo Distinguished University Professor:* J.S. Lindsey; *Alumni Distinguished Undergraduate Professor:* F.C. Hentz, Jr; *Alumni Distinguished Undergraduate Professor Emeritus:* W.P. Tucker; *Professors:* A.J. Banks, R.D. Bereman, E.F. Bowden, C.L. Bumgardner, H.H. Carmichael, D.L. Comins, K.W. Hanck, M.H. Khaledi, S.G. Levine, R.J. Linderman, C.G. Moreland, J.G. Osteryoung, R.A. Osteryoung, A. F. Schreiner, G. H. Wahl Jr., M-H. Whangbo, J.K. Whitesell, J.L. Whitten; *Professors Emeriti:* L.D. Freedman, F.W. Getzen, Z.Z. Hugus, L. A. Jones, R.H. Leoppert, G.G. Long, S.T. Purrington, E.O. Stejskal, R.C. White; *Associate Professors:* C.B. Boss, T.C. Caves, D.A. Shultz, W.L. Switzer, D.W. Wertz; *Associate Professor Emeritus:* A.F. Coots, Y. Ebisuzaki; *Assistant Professors:* D.L. Feldheim, S. Fanzen, C.B. Gorman, J.D. Martin, B. Wang; *Assistant Professor Emeritus:* W.R. Johnston; *Research Assistant Professors:* J. J. O'Dea, R. W. Wagner, H. Yang; *Visiting Assistant Professors:* S.L. Levine, M.Prisant, K.A. Sandberg, L.E. Sremaniak; *Associate Faculty:* D.W. Brenner *(Materials Science and Engineering)*, J.D. Otvos *(Biochemistry); Laboratory Supervisors:* P.D. Boyle, H.S. Gracz, C.A. Haney, L.W. Harrison, G.L. Hennessee, G.A. Neyhart, S. S. Sankar; *Laboratory Demonstrator:* S.P. Holt; *Teaching and Research Technician:* D.E. Knight; *Teaching Technician:* M.L. Belisle.

Chemistry is the science dealing with the composition, structure, and properties of all substances and changes that they undergo. Chemists have contributed to the synthetic fiber industry, petroleum products and fuels, plastics, the food processing industry, nuclear energy, electronics, modern drugs and medicine. Today's chemists are concerned with the fundamental building blocks of all materials - atoms and molecules - leading to improvement of old materials, development of substitutes or new ones, and an understanding of our material environment.

OPPORTUNITIES

The chemical industry is the nation's largest manufacturing industry. Chemists comprise the largest proportion of scientists in the United States and future demand for chemists should continue to grow. A variety of jobs are open to the chemist: biochemistry and other biological areas, education, medicine, law, metallurgy, marine science, space science, oceanography, sales and management, pure research and development. Chemists are employed in every field based on modern technology; opportunities for chemists in the field of education are many and varied.

CURRICULA

The B.A. program offers a flexible course of studies for students who may not plan to become professional chemists but who desire an interdisciplinary program with an emphasis on chemistry. The proper choice of electives will prepare the graduate for any of the following: medical, veterinary or dental school; work in chemical sales and management; teaching in secondary schools; work in environmental science; or graduate school in an allied science. Since the first three semesters are essentially identical to those of the B.S. program, students may enter the B.A. program either directly from high school or some later point after entering the university.

The B.S. curriculum, accredited by the American Chemical Society, includes a strong, broad background in mathematics, physics and the liberal arts. The basic areas of organic, physical, inorganic and analytical chemistry are stressed. Laboratory and classroom work develop the skills, knowledge and inquiring spirit necessary for a successful career in chemistry. The advised elective credits allow individual diversity at the junior and senior levels. Many undergraduates participate in current departmental research through part-time employment or research projects. The B.S. curriculum prepares the student to enter the job market directly as a chemist or to enter various professional schools or graduate school in chemistry or an allied science. This route is also an excellent premedical program.

The Bachelor of Science in Chemistry-Marine Sciences Concentration provides students the knowledge associated with a B.S. degree in chemistry but also applies that knowledge to a natural environmental setting (in this case, the marine environment). Many students have an environmental awareness and a desire to pursue environmental issues along with their interest in physical science. This degree allows a student to take all of the courses necessary to become an accredited ACS (American Chemical Society) chemist along with the oceanography courses necessary to apply that chemical information to an interesting and complex environment like the ocean.

CURRICULUM IN CHEMISTRY
Degree earned: B.A. in Chemistry

FRESHMAN YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
CH 101 Chemistry - A Molecular Science[1]	3	CH 201 Chemistry - A Quantitative Science[1]	3
CH 102 General Chemistry Lab	1	CH 202 Quantitative Chemistry Lab	1
ENG 111 Comp. and Rhetoric[1]	3	ENG 112 Comp. and Reading[1]	3
MA 141 Analytic Geom. & Calculus I[1]	4	MA 241 Analytic Geom. & Calculus II	4
PMS 100 Orientation to PAMS [1]	1	Humanities/Social Science Elective	3
Humanities/Social ScienceElective[3]	3	Any 100-level PE in Fitness & Wellness[2]	1
	15		16

SOPHOMORE YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
CH 221 Organic Chemistry I[1]	4	CH 223 Organic Chemistry II[1]	4
PY 205 Physics for Engr. & Sci. I[1]	4	PY 208 Physics for Engr. & Sci. II	4
History Elective[4]	3	Literature Elective[5]	3
Humanities/Social Science Elective[3]	3	Physical Education Elective	1
	14	Free Elective	3
			15

JUNIOR YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
CH 331 Introductory Physical Chemistry[1]	4	CH 315 Quantitative Analysis[1]	4
Advised Elective[6]	4	Advised Elective[6]	4
Humanities/Social Science Elective[3]	3	Science Elective	4
Science Elective	4	Writing Elective[7]	3
	15		15

SENIOR YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
CH 401 Systematic Inorganic Chemistry I	3	BCH 451 Introductory Biochemistry	4
Advised Electives[6]	6	Advised Electives[6]	4
Humanities/Social Science Electives[3]	6	Humanities/Social Science Elective[3]	3
Free Elective	1	Free Elective	4
	16		15

Minimum Hours Required for Graduation: 121[2,8]

[1]D grades are NOT accepted in CH 101, CH 107, CH 221, CH 223, CH 315, CH 331, ENG 111, ENG 112, MA 141, PY 205.
[2]The Fitness & Wellness requirement can be met by taking any one of several PE 100 courses. [3]These courses, selected from University-approved General

Education Requirements (GER) lists for Humanities and Social Sciences, must includes the following: one course (3 hours) from Philosophy, Religion, or Visual and Performing Arts; two courses (6 hours) representing two different areas in Anthropology, Cultural Geography, Economics, Politics and Government, Psychology, and/or Sociology; one course (3 hours) from the Science, Technology and Society (Humanities and Social Sciences Perspective) list. At least one of the courses chosen to satisfy the Humanities and Social Sciences requirement must focus on a non-English speaking culture.
[4]To be selected from GER History Electives List.
[5]To be selected from GER Literature Electives List.
[6]Advised electives are designed to allow students to concentrate in areas related to academic or career goals. Courses used to fulfill this requirement are selected by students after consultation with and approval by their advisers or the Coordinator of Advising.
[7]To be selected from GER Advanced Writing List.
[8]All students must demonstrate foreign language proficiency at the FL_102 level.

CURRICULUM IN CHEMISTRY
Degree earned: B.S. in Chemistry

FRESHMAN YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
CH 101 Chemistry - A Molecular Science[2]	3	CH 201 Chemistry - A Quantitative Science[2]	3
CH 102 General Chemistry Lab	1	CH 202 Quantitative Chemistry Lab	1
CH 106 Computer Applic. Chemistry I	1	CH 108 Computer Applic. Chemistry II	1
ENG 111 Comp. and Rhetoric[1]	3	ENG 112 Comp. and Reading[1]	3
MA 141 Analytic Geom. & Calculus I[1]	4	MA 241 Analytic Geom. & Calculus II[1]	4
PMS 100 Orientation to PAMS	1	Humanities/Social Science Elective[3]	3
Humanities/Social Science Elective[3]	3	Any 100-level PE in Fitness & Wellness[2]	1
	16		16

SOPHOMORE YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
CH 221 Organic Chemistry I	4	CH 211 Analytic Chemistry I	3
MA 242 Analytic Geom. & Calculus III[1]	4	CH 212 Analytic Chemistry I Lab	1
PY 205 Physics for Engr. & Sci. I[1]	4	CH 223 Organic Chemistry II[1]	4
History Elective[4]	3	MA 341 Diff. Equations I	3
Physical Education Elective	1	PY 208 Physics for Engr. & Sci. II[1]	4
	16		15

JUNIOR YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
CH 401 Syst. Inorganic Chemistry I	3	CH 402 Inorganic Chemistry Lab	1
CH 428 Qualitative Organic Analysis	3	CH 403 Syst. Inorganic Chemistry II	3
CH 431 Physical Chemistry I[1]	3	CH 433 Physical Chemistry II[1]	3
Advised Elective[5]	3	CH 434 Physical Chemistry Lab	3
Humanities/Social Science Elective[3]	3	Advised Elective[5]	3
		Humanities/Social Science Elective[3]	3
	15		16

SENIOR YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
CH 415 Analytic Chemistry II	3	Advised Elective[5]	3
CH 416 Analytic Chemistry Lab	1	Humanities/Social Science Elective[3]	3
CH 435 Intro. Quantum Chemistry or		Literature Elective[7]	3
PY 407 Intro. Modern Physics	3	Free Elective	3
Advised Elective[5]	3		12[8]
Writing Electives[6]	3		
Free Elective	2		
	15		

Minimum Hours Required for Graduation: 121[2,9]

[1]D grades are NOT accepted in CH 101, CH 201, CH 221, CH 223, CH 431, CH 433, ENG 111, ENG 112, MA 141, MA 241, MA 242, PY 205, PY 208.
[2]Fitness and Wellness requirement can be met by taking any one of several PE 100 courses.
[3]These courses, selected from University-approved General Education Requirements (GER) lists for Humanities and Social Sciences, must include the following: one course (3 hours) from Philosophy, Religion, or Visual and Performing Arts; two courses (6 hours) representing two different areas in Anthropology, Cultural Geography, Economics, Politics and Government, Psychology, and/or Sociology; one course (3 hours) from the Science, Technology and Society (Humanities and Social Sciences Perspective) list. At least one of the courses chosen to satisfy the Humanities and Social Sciences requirement must focus on a non-English speaking culture.
[4]To be selected from GER History Electives List.
[5]Advised electives are designed to allow students to concentrate in areas related to academic or career goals. Courses used to fulfill this requirement are selected by students after consultation with and approval by their advisers or the Coordinator of Advising.
[6]To be selected from GER Advanced Writing List.
[7]To be selected from GER Literature Electives List.
[8]This semester is deliberately light so that students will have time for research or other special projects and interests.
[9]All students must demonstrate foreign language proficiency at the FL_102 level.

CURRICULUM IN CHEMISTRY, MARINE SCIENCES CONCENTRATION[1]
Degree earned: B.S. in Chemistry

FRESHMAN YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
CH 101 Chemistry - A Molecular Science[2]	3	CH 201 Chemistry - A Quantitative Science[2]	3
CH 102 General Chemistry Lab	1	CH 202 Quantitative Chemistry Lab	1
CH 106 Computer Applic. Chemistry I	1	CH 108 Computer Applic. Chemistry II	1
ENG 111 Comp. and Rhetoric[2]	3	ENG 112 Comp. and Reading[2]	3
MA 141 Analytic Geom. & Calc I[2]	4	MA 241 Analytic Geom. & Calculus II[2]	4
PMS 100 Orientation to PAMS	1	Humanities/Social Science Electives[4]	3
Humanities/Social ScienceElective[4]	3	Any 100-level PE in Fitness & Wellness[2]	1
	16		**16**

SOPHOMORE YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
CH 221 Organic Chemistry I[2]	4	CH 211 Analytic. Chemistry I	3
MA 242 Analytic Geom. & Calculus III[2]	4	CH 212 Analytic. Chemistry I Lab	1
MEA 200 Intro. to Ocenaography[1]	3	CH 223 Organic Chemistry II[2]	4
MEA 210 Oceanography Lab[1]	1	MEA 220 Marine Biology[1]	3
PY 205 Physics for Engr. & Sci. I[2]	4	PY 208 Physics for Engr. & Sci. II[3]	4
	16	Physical Education Elective	1
			16

JUNIOR YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
CH 401 Syst. Inorganic Chemistry I	3	CH 402 Inorganic Chemistry Lab	1
CH 428 Qualitative Organic Analysis	3	CH 403 Syst. Inorganic Chemistry II	3
CH 431 Physical Chemistry I[2]	3	CH 433 Physical Chemistry II[2]	3
MA 341 Diff. Equations I	3	CH 434 Physical Chemistry Lab	3
Humanities/Social Science Elective[3]	3	MEA 323 Earth System Chemistry[1]	3
	15	History Elective[5]	3
			16

SENIOR YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
CH 415 Analytical Chemistry II	3	Humanities/Social Science Electives[4]	6
CH 416 Analytical Chemistry Lab	1	Literature Elective[7]	3
CH 435 Intro. Quantum Chemistry or		Free Elective	3
PY 407 Intro. to Modern Physics	3		**12[8]**
MEA 473 Chemical Oceanography[1]	3		
Writing Electives[6]	3		
Free Elective	1		
	14		

Minimum Hours Required for Graduation: 121[3,9]

[1]In the Marine Sciences concentration, the designated MEA courses constitute Advised Electives. This increases by one credit the requirement of the straight B.S. program. This increase is accommodated by decreasing free elective credits by one (to 4), keeping the minimum hours required for graduation at 121.
[2]D grades are NOT accepted in CH 101, CH 201, CH 221, CH 223, CH 431, CH 433, ENG 111, ENG 112, MA 141, MA 241, MA 242, PY 205, PY 208.
[3]Fitness and Wellness requirement can be met by taking any one of several PE 100 courses.
[4]These courses, selected from University-approved General Education Requirements (GER) lists for Humanities and Social Sciences, must include the following: one course (3 hours) from Philosophy, Religion, or Visual and Performing Arts; two courses (6 hours) representing two different areas in Anthropology, Cultural Geography, Economics, Politics and Government, Psychology, and/or Sociology; one course (3 hours) from the Science,Technology and Society (Humanities and Social Sciences Perspective) list. At least one of the courses chosen to satisfy the Humanities and Social Sciences requirement must focus on a non-English speaking culture.
[5]To be selected from GER History Electives List.
[6]To be selected from GER Advanced Writing List.
[7]To be selected from GER Literature Electives List.
[8]This semester is deliberately light so that students will have time for research or other special projects and interests.
[9]All students must demonstrate foreign language proficiency at the FL_102 level.

DEPARTMENT OF MARINE, EARTH AND ATMOSPHERIC SCIENCES

http://ww2.ncsu.edu/ncsu/pams/meas/

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L.J. Pietrafesa, *Head*
D.L. Wolcott, *Undergraduate Coordinator and Marine Sciences Undergraduate Programs*
E.F. Stoddard, *Geology Undergraduate Programs*
G.W. Watson, *Meteorology Undergraduate Programs*

University Distinguished Scholar: T.F. Malone; Scholar in Residence: R. Braham.*Alumni Distinguished Undergraduate Professor:* V.V. Cavaroc Jr., C.E. Knowler; *Professors;* S.P.S. Arya, N.E. Blair, V.V. Cavaroc Jr., J.M. Davis, D.J. DeMaster, R.V. Fodor, G.S. Janowitz, D.L. Kamykowski, Y-L. Lin, L.J. Pietrafesa, S. Raman, V.K. Saxena, T.G. Wolcott; *Visiting Professors:* T.F. Clark, T.S. Hopkins, H. Reichle, D.A. Russell;*Adjunct Professors:* S. Change, A.H. Hines, R.K.M. Jayanty, S.K. LeDuc, R.V. Madala, P. Minnet, J.M. Pelissier, S. Riggs, W.H. Snyder, G.W. Thayer,*Professors Emeriti:* H.S. Brown, L.J. Langfelder, C.J. Leith, W.J. Saucier, C.W. Welby;*Associate Professors:* J.P. Hibbard, M.M. Kimberley, S.E. Koch, C.E. Knowles, E.L. Leithold, J.M. Morrison, A.J. Riordan, F.H.M. Semazzi, P-T. Shaw, W.J. Showers, E.F. Stoddard, G.F. Watson, D.L. Wolcott;*Research Professor:* V. Aneja; *Visiting Associate Professors:* E.N. Buckley, V.S. Connors, M.L. Kaplan;*Adjunct Associate Professors:* M.G. Bevis, S. Businger, V.S. Conners, R.S. Harmon, L.A. Levin, R. Wiener; *Assistant Professors:* T.G. Drake, D.B. Eggleston, D.G. Evans, S.W. Snyder, L. Xie; *Adjunct Assistant Professors:* W.G. Ambrose, D.E. Checkley, T.B. Curtin, A.F. Hanna, G.J. Kirkpatrick, J.C. Reid, S. Ross, R.J. Wayland

The Department of MEAS covers a broad range of disciplines with one overarching goal: a deeper understanding of the Earth's environment. MEAS takes an interdisciplinary approach to studying our planet's air, earth and water, combining meteorology, earth science, and oceanography in a single department.

This interdisciplinary viewpoint is particularly important today, in light of accelerating global changes and increasing corporate and public interest in environmental health and wise use of natural resources. Many pressing questions require more than narrow training in a single discipline. MEAS graduates can be equipped for tasks as diverse as improving severe storm forecasting; assessing potential effects of oil exploration; modeling global climate trends or coastal flooding; understanding the transport of tree-killing air pollutants from industrial centers to the North Carolina mountains; developing non-polluting technology for mining; ascertaining dinosaurian physiology and ecological niches; investigating global ozone depletion, or devising plans to minimize erosion and pollution of coastlines.

MEAS offers degrees in meteorology, geology, environmental sciences and natural resources. Marine sciences concentrations, which are highly interdisciplinary curricula, are available in chemical oceanography, physical oceanography, coastal geology, and marine meteorology. Earth science courses encompass the entire earth, from the core, through the crust, to the minerals, sediments, groundwater, and landforms of the surface. Tools learned allow students to understand and characterize the physical and historical earth. Other courses provide knowledge to explain the internal forces of the Earth, and to investigate the Earth by measuring physical phenomena like gravity, magnetism, heat, electricity and acoustic waves.

Coursework in all areas of geology equip students to reduce potential disasters from geological hazards and to ameliorate the negative impact of human society on the geological resources of the earth. An earth systems history concentration produces graduates knowledgeable about the evolution of earth ecosystems. Meteorology training teaches students how the atmosphere functions, and how to address problems like air pollution, climate changes, and severe weather, such as thunderstorms, tornadoes, winter storms, and hurricanes. Forecasting and climate studies are enhanced by using real-time satellite imagery, radar-data products, and state-of-the-art computer technology. MEAS majors in Environmental Sciences and Natural Resources fill a unique need in today's society as experts who can interpret their science to public policy shapers and decision-makers. The training they receive in economics, political science, and policy issues, and management (for Natural Resources majors) equips MEAS graduates to interact with industry, and with regulatory and conservation agencies.

Planet Earth is MEAS's natural laboratory. While most scientists conduct experiments under controlled conditions designed to replicate some facets of nature, we use ships, submarines, aircraft, and satellites and unattended monitoring instruments to directly and remotely probe the natural environment itself. Computer modeling helps us visualize the real-world information, and to design the next experiments. Field study is an integral part of MEAS educational programs, enabling students to apply concepts learned in the classroom to projects in the field. Summer field courses take students to the Southwest or to the North Carolina coast for intensive training in field methods. Shorter field trips are part of classes in all disciplines.

OPPORTUNITIES

MEAS undergraduate degree programs provide talented students with the foundation of scientific knowledge for careers in government, industry or academe. Graduates in all fields can meet a critical need for well-trained teachers in the sciences by pursuing a double major in a core science and in science education. These undergraduate curricula also prepare students to pursue graduate or professional degrees. Careers are open to all genders and races.

Graduates with a focus on marine sciences and oceanography may conduct pure and applied research, serving as environmental consultants for industry and governmental agencies, policy and management experts for governmental agencies; and environmental science educators. Graduates with a Natural Resources degree are versed in the fundamental processes and interdisciplinary nature of the coastal zone. As scientists, managers, administrators and regulators, they make decisions regarding use and conservation of coastal and marine resources.

Geology graduates address society's needs for water supply and water quality, from residential and industrial supply and disposal to ecosystem health in rivers and estuaries; they work for engineering firms and permit-issuing agencies; and they are recruited by industries that rely on geological resources. Earth systems history geologists are familiar with the evolution of ecosystems through time, and provide a perspective on potential long-term reactions of the biosphere to both past and current changes and stresses. Their expertise is used in education, including museums, and in theoretical and practical study of biosphere response. Those with Environmental Science degrees are trained to assess and monitor geological resources hazards like groundwater contamination. Marine geologists are experts in the complex issues facing industry, municipalities and residents in the dynamic and ecologically-vulnerable coastal zone.

Meteorology graduates may enjoy careers in weather forecasting, air quality assessment, weather products and services, broadcast communications, and advanced research. Using Doppler radar, forecasters are now able to predict severe weather with unprecedented accuracy. Marine meteorologists study ocean-generated weather systems. Their research is yielding practical benefits like refined prediction of storm surge, which has streamlined evacuation efforts during severe storms along the Carolina coast.

Environmental Sciences graduates with a meteorology emphasis may work for environmental firms. Study of air quality and how air pollution is transported and dispersed is a rapidly expanding field in the atmospheric sciences.

MEAS graduates play a key service role for the State of North Carolina, assisting in everything from analyzing the impact of atmospheric pollutants on agriculture and our estuaries, to determining the effects of toxic waste disposal on quality of surface and ground water.

HONORS PROGRAM

Participants receive enhanced coverage of academic material and are involved in research. Eligibility is based on scholastic achievement. Minimum requirements are a GPA of 3.5 overall and 3.5 in the major, including required mathematics, chemistry and physics courses taken to date. Students are reviewed for eligibility after the first semester of the sophomore year and again as first-semester juniors. Participation is optional. To successfully complete the honors program, a student will acquire a minimum of 9 credit hours of honors work, including 3 to 6 hours of independent study culminating in a written scientific report, and one of the following options: oral presentation in the department, a poster presentation at the Sigma XI Undergraduate Research Symposium, or presentation at a professional meeting. The remaining honors credit is earned in honors' sections of undergraduate courses, and in advanced (graduate) courses. Students must graduate with a 3.4 grade point average overall.

UNDERGRADUATE RESEARCH, COOPERATIVE EDUCATION AND INTERNSHIPS

Honors Program participants, as many as 10 percent of MEAS undergraduates, obtain valuable experience assisting with research projects. Examples of past research projects include studies of coral reef fish in the Bahamas to understand age, growth and life history transitions; assessment of Lake Victoria's impact on the climate of East Africa; examination of the relationship between atmospheric ozone and meteorological parameters as measured with instrumented balloons; experiments on generation of oxygen from moon rocks to supplement a manned moon station; and reconstruction of events during past volcanic eruptions on Hawaii.

Outstanding MEAS students can receive career training with pay through the NC State Cooperative Education program, after completing the first year of undergraduate studies. Co-op and internship students have completed assignments with the National Weather Service, US Geological Survey, US Air Force, US Environmental Protection Agency, NC Museum of Natural Sciences, NC State Climate Office, NC Division of Marine Fisheries, NASA, local environmental consulting firms, and other state and federal agencies. Many students co-op or intern at the internationally renowned Research Triangle Park. After graduation, co-op students often are hired full-time by the same companies or agencies.

FACILITIES

The home base of MEAS is Jordan Hall, a recently built, award-winning structure that accommodates regular and televideo classrooms, teaching laboratories, research laboratories, computing facilities, and offices of faculty and staff. Jordan Hall has several facilities housing networked computers, some for unstructured student use, and some, like the Weather Analysis and Forecasting Laboratory, for teaching. From the rooftop Weather Observatory, weather facsimile data is received and weather balloons launched. Other new structures include the Research III building on NC State's Centennial Campus, which houses the Facility for Ocean and Atmospheric Modeling and Visualization (FOAM-V). This is a massively-parallel supercomputing center supporting teaching, research and extension, especially in the MEAS focus on air-sea interaction. Research III also houses National Weather Service staff, who generate detailed wind data from a NEXRAD Doppler Radar. Upper-division students in the meteorology program are on standby during severe weather conditions to assist and observe at the NWS. Research III also houses the State Climate Office, where many students gain skills in instrumentation, data acquisition, data analysis, and interaction with the public. For class work and field research in coastal settings, students may look forward to completion of NC State's Center for Marine Sciences and Technology on the shore of Bogue Sound, in Morehead City, in 1999.

Students who attend a research-intensive ("Research I") university benefit from the opportunity to engage in research as undergraduates and to study with professors whose involvement in research keeps their knowledge and enthusiasm fresh. The faculty of MEAS are internationally-acknowledged research scientists, and the Department maintains an extensive inventory of both laboratory and field research equipment and facilities. As a member of the Duke/UNC Oceanographic Consortium, MEAS has access to the *R/V Cape Hatteras*, a 135' coastal oceanographic research vessel, which serves as a platform for work on the physics, chemistry, geology, biology and meteorology of the sea from New England to Central America and as far out as Bermuda. Training cruises on the *R/V Cape Hatteras* occur each semester, providing practical experience in oceanography for marine science majors. Specialized equipment in the department supports teaching and research in: geological materials (electron microprobe, X-ray fluorescence spectrometer, an automated X-ray diffractometer, neutron activation analysis), geophysical measurements (GPS, gravimeter, magnetometer, seismic reflection), and sedimentology (microcomputer-controlled grain-size analysis). Stable- and radio-isotope laboratories support research in biogeochemical cycling, paleoclimatology and paleoecology. Ecological studies are supported by a Motion Analysis System, a biotelemetry laboratory, and the departmental membership in the Cooperative Institute of Fisheries Oceanography, a joint venture of NOAA's National Marine Fisheries Service and a number of universities within the state. Advancements in Air-Sea Interactions come through the Satellite Oceanography and Image Analysis Laboratory; the Physical Oceanographic Research Laboratory with its complement of equipment to monitor the oceans' motion and composition; the Planetary Boundary-Layer Laboratory with its instrumentation for monitoring physical processes at the land-air and sea-air interfaces; the Man-Interactive Data Acquisition System for experiments in severe storm forecasting and regional weather forecasting; and the FOAM-V facility. All programs benefit from access to massive computing power including the North Carolina Supercomputing Center, supported by a wide assortment of computer graphics devices and remote terminals and print services.

CURRICULA

The department offers several curricula in each of the areas of marine, earth and atmospheric sciences. Each prepares students for employment at graduation or for further professional training. There are three bachelor of science (B.S.) curricula in atmospheric sciences: meteorology, marine meteorology, and environmental sciences—air quality. Most students in meteorology or in forecasting with private organizations and public agencies. Air quality graduates are employed by consulting furms, private industry and public agencies. Earth sciences house seven curricula: B.A. (bachelor of arts) and B.S. in geology, B.S. in geology with a concentration in marine science, B.A. and B.S. in geology with a concentration in earth systems history, and B.S. in environmental sciences—geology concentration. The B.A. and B.S. degree programs require similar core courses, but the B.A. contains more social sciences and humanities, and the B.S. more mathematics and other physical sciences. The marine sciences concentration adds marine sciences to the geology curriculum, but with an increased emphasis on paleontology, paleobiology, and paleoecology. All environmental sciences degrees combine core knowledge in the science with economics, politics, and policy. Geologists are employed in both the private and public sector. The B.S. in natural resources, with a concentration in marine and coastal resources, combines marine sciences with economics, politics, policy, and management, to prepare scientists who can interface with policy-makers and regulators.

CURRICULUM IN GEOLOGY
Degree earned: B.A. in Geology

FRESHMAN YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
ENG 111 Comp. & Rhetoric	3	CH 101 Chemistry - A Molecular Science	3
MA 131 Calculus for Life & Mgmt. Sci. A	3	CH 102 General Chemistry Lab	1
MEA 101 Geology I:Physical	3	ENG 112 Comp. and Reading	3
MEA 110 Geology I Lab	1	MEA 102 Geology II: Historical	3
Any 100-level PE in Fitness & Wellness[1]	1	MEA 111 Geology II Lab	1
PMS 100 Perspectives on Learning	1	Social Science Elective[2]	3
History/Literature Elective[2]	3	Physical Education Elective	1
	15		**15**

SOPHOMORE YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
CSC 200 Intro. Computers & Use[4]	3	CH 201 Chemistry - A Quantitative Science	3
MEA 330 Mineralogy & Optical Mineralogy	5	CH 202 Quantitative Chemistry Lab	1
Math/Statistics Option[3]	3	COM 110 Public Speaking	3
Social Science Elective[2]	3	MEA 440 Igneous. & Meta. Petrol.	4
Free Elective	3	History/Literature Elective[2]	3
	17		**14**

JUNIOR YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
MEA 450 Sediment Pet. & Strat.	4	MEA 451 Structural Geology	4
PY 211 College Physics I	4	Earth Science Elective[6]	3
Advanced Writing[5]	3	Science Option[7]	4
Phil., Relig., Vis/Perf. Arts Elective[2]	3	Humanities/Social Science Elective[2]	3
Free Elective	3		**14**
	17		

SENIOR YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
Advised Elective[9]	3	MEA 491 Senior Seminar	2
Earth Science Elective[6]	3	Advised Elective[9]	3
Humanities/Social Science Elective[2]	3	Earth Science Elective[6]	3
Phil./History. of Sci. Option[7]	3	Humanities/Social Science Elective[2]	3
Free Elective	3	Free Elective	3
	15		**14**
		Minimum Hours Required for Graduation	**127[10]**

[1]Any Physical Education course at the 100 level.
[2]These courses must be selected from the approved GER Listings for Social Sciences and Humanities and must include the following: 6 Hours in History and/or Literature; 6 Hours representing two different areas in Economics, Political Science, Government, Sociology, Anthropology, and/or Cultural Geography; and 3 Hours in Philosophy, Religion or Visual & Performing Arts.
At least *one* of your *total* selection of Social Sciences and Humanities courses must deal with a non-English speaking culture, and *three* of your *total* selection of the Social Sciences and Humanities courses must be beyond the introductory level.
[3]One of the following: MA 231, 114; ST 311.
[4]The following may be substituted for CSC 200; CSC 112 or CSC 114..
[5]ENG 331 or ENG 332or ENG 333.
[6]Earth Science Electives: MEA 250/251 and other courses above the 300 level. Select electives in consultation with your advisor.
[7]On of the following: PY 212; BO 200; SSC 200; BIO 125.
[8]Any course from the Science, Technology and Society (Humanities & Soc. Sci. Perspective) GER listing.
[9]Advised electives may be in geology or in a supporting field. Select in consultation with your advisor.
[10]Graduation also requires foreign language proficiency at the FL_102 level.

CURRICULUM IN GEOLOGY
Degree earned: B.S. in Geology

FRESHMAN YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
CH 101 Chemistry - A Molecular Science	3	CH 201Chemistry - A Quantitative Science	3
CH 102 General Chemistry Lab	1	CH 202 Quantitative Chemistry Lab	1
ENG 111 Comp. & Rhetoric	3	ENG 112 Comp. and Reading	3
MA 141 Calculus I	4	MA 241 Calculus II	4
MEA 101 Geology I:Physical	3	MEA 102 Geology II:Historical	3
MEA 110 Geology I Lab	1	MEA 111 Geology II Lab	1
Any 100-level PE in Fitness & Wellness[1]	1		**15**
PMS 100 Perspectives on Learning	1		
	17		

SOPHOMORE YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
MA 242 Calculus III	4	MEA 440 Igneous & Meta. Petrol.	4
MEA 330 Mineralogy & Optical Mineralogy	5	PY 205 Physics Engr. & Sci. I	4
Computer Science Option[2]	3	History/Literature Elective[3]	3
History/Literature Elective[3]	3	Statistical Science Option[4]	3
	15	Physical Education Elective	1
			15

JUNIOR YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
ENG 333 Comm. for Sci. & Researchers[5]	3	COM 110 Public Speaking	3
MEA 450 Sediment Pet. & Strat.	4	MEA 451 Structural Geology	4
PE 208 Physics Engr. & Sci. II	4	Math/Sci. Elective[7]	3
Social Science Elective[3]	3	Social Science Elective[3]	3
	14	Technical Elective A[6]	3
			16

SUMMER SESSION
MEA 465,466 Geologic Field Camp I, II 6

SENIOR YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
Earth Science Elective[8]	3	MEA 491 Senior Seminar	2
Phil., Relig., Vis/Perf. Arts Elective[3]	3	Earth Science Elective[8]	3
Humanities/Social Science Elective[9]	3	Earth Science Elective[8]	3
Technical Elective B[6]	3	Humanities/Social Science Elective[9]	3
Free Elective	3	Free Elective	3
	15		**14**

Minimum Hours Required for Graduation: 127[10]

[1]Any Physical Education course at the 100 level.
[2]Computer Science Option to be selected from among CSC 112, CSC 114, and CSC 200.
[3]These courses must be selected from the approved GER Listings for Social Sciences and Humanities and must include the following: 6 Hours in History and/or Literature; 6 Hours representing two different areas in Economics, Political Science, Government, Sociology, Anthropology, and/or Cultural Geography; and 3 Hours in Philosophy, Religion or Visual & Performing Arts.
At least *one* of your *total* selection of Social Sciences and Humanities courses must deal with a non-English speaking culture, and *three* of your *total* selection of the Social Sciences and Humanities courses must be beyond the introductory level.
[4]Statistical Science Option to be selected from among ST 301, ST 361, and ST 371.
[5]ENG 331 or ENG 332 may be substituted for ENG 333.
[6]Technical Elective is a paired two-course sequence in a related field. For example: PY 411 and 412; BIO 125 and MEA 220.
Courses used to fulfill other requirements may not be applied to the Technical Elective requirement.
[7]Math/Science Option to be selected from among CH 220, 221, 315, 331, 431; MA 305, 341, 421; PY 407, MAE 301; CSC 302; CE 213; ST 302.
[8]Earth Science Electives: MEA 250/251 and other courses above the 300 level.
[9]One of these must include a course from the Science, Technology, and Society (Humanities & Social Sciences Perspective) GER listing.
[10]Graduation also requires foreign language proficiency at the FL_102 level.

CURRICULUM IN GEOLOGY, EARTH SYSTEMS HISTORY
Degree earned: B.S. in Geology

FRESHMAN YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
BIO 125 General	3	CH 201 Chem. Quant. Sci.	3
CH 101 Chem. Molecular Sciences	1	CH 202 Quant. Chemistry Lab	1
CH 102 General Chemistry Lab	3	ENG 112 Composition and Reading	3
ENG 111 Composition & Rhetoric	3	MA 141 Calculus I	4
MEA 101 Geology I: Physical	3	MEA 102 Geology II: Historical	3
MEA 110 Geology I Lab	1	MEA 111 Geology II Lab	1
PE 100 Health and Physical Fitness[1]	1	Physical Education Elective	1
PMS 100 Introduction to PAMS	1		**16**
	15		

SOPHOMORE YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
CSC 200 Intro. Computers	3	MA 242 Calculus III	4
MA 241 Calculus II	4	MEA 440 Igneous and Metamorphic Petrology	4
MEA 268 Marine Paleontology	4	History/Literature Elective[2]	3
MEA 330 Mineralogy and Crystallography	5	PY 205 Physics for Engr. & Sci. I	4
	15		**15**

JUNIOR YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
MEA 450 Sediment Pet. & Strat.	4	MEA 369 Terrestrial Paleontology	4
PY 208 Physics for Eng. & Sci. II	4	MEA 451 Structural Geology	4
ST 311 Intro. to Statistics	3	History/Literature Elective[2]	3
Social Science Elective[3]	3	Social Science Elective[3]	3
	14		**14**

SUMMER SESSION

MEA 465,466 Summer Field Camp I, II	6

SENIOR YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
BO 360/365 Intro. to Ecology and Ecology Lab	4	MEA 384 Paleontology	3
ZO 260 Evolution, Behavior, Ecol. *or*		MEA 486 Paleoclimates	3
GN 411 Principles of Genetics *or*		MEA 491 Senior Seminar	2
ENG 333 Comm. for Science and Res.	3	Free Elective	3
ZO 450 Evolutionary Biology	3	Humanities/Social Science Elective[2]	3
Humanities/Social Science Elective[2, 4]	3		**14**
Philosophy/Religion/Visual Arts Elective[2]	3		
	16		
		Minimum Hours Required for Graduation:	**128[5]**

[1]Any Physical Education course at the 100 level.
[2]At least one of the Humanities or Social Science courses must focus on a non-English speaking culture.
[3] Social Science Electives must include two courses or the equivalent from different content areas in the study of psychology, economics, politics and government, sociology, anthropology, and cultural geography.
[4]One of these must include a course from the Science, Technology, and Society (Humanities & Social Sciences Perspective) G.E.R. listing
[5]Students must have demonstrated foreign language proficiency at the FL 102 level.

CURRICULUM IN GEOLOGY, EARTH SYSTEMS HISTORY
Degree earned: B.A. in Geology

FRESHMAN YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
CH 101 Chemistry- A Molecular Science	3	BIO 125 General Biology	4
CH 102 General Chemistry Lab	1	CH 201 Chemistry - A Quantitative Science	3
ENG 111 Comp. & Rhetoric	3	CH 202 Quantitative Chemistry Lab	1
MA 131 Analytic Geom. & Calc.A	4	ENG 112 Comp & Reading	3
MEA 101 Geology I: Physical	3	MA 132 Comp Math Life Mgmt. Science	1
MEA 110 Geology Lab	1	MEA 102 Geology II: Historical	3
Any 100-level PE in Fitness & Wellness[1]	3	MEA 111 Geology Lab II	1
PMS 100 Intro. to PAMS	1		16
	16		

SOPHOMORE YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
CSC 200 Intro. Computers & Use	3	MEA 369 Terrestial Paleontology	4
MEA 268 Marine Paleontology	4	MEA 410 Intro. to Geologic Mat.	4
PY 211 College Physics I	4	History/Literature Elective[4]	3
Physical Fitness Elective[1]	3	Social Science Elective[2]	3
Social Science Elective[2]	1		**14**
	15		

JUNIOR YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
ENG 333 Comm. for Sci.& Res.	3	GN 411 Prin. of Genetics	4
MEA 450 Sedimentary Pet. & Strat.	4	BO 360 Intro. to Ecology *or*	4
ST 311 Intro. to Statistics	3	ZO 260 Evolution, Behavior, Ecol.	
Free Elective	3	MEA 384 Paleoecology	3
Phil., Relig., Vis/Perf. Arts Elective	3	MEA 451 Structural Geology	4
	16		15

SUMMER SESSION

MEA 465,466 Summer Field Camp I, II	6

SENIOR YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
Advised Elective	3	MEA 486 Paleoclimates	3
Free Elective	3	MEA 491 Senior Seminar	3
History/Literature Elective	3	Advised Elective	3
Humanities/Social Science Elective[4]	3	Humanities/Social Science Elective[4]	2
ZO 450 Evolutionary Biology	3	Phil./History of Science[3]	3
	15		**14**

Minimum Hours Required for Graduation: **127**[5]

[1]Any Physical Education course at the 100 level.
[2]Social Science Electives must include two courses or the equivalent from different content areas in the study of psychology, economics, politics and government, sociology, anthropology and cultural geography
[3]Any course from the Science, Technology and Society (Humanities and Social Sciences Perspectives) GER list.
[4]At least one of the Humanities or Social Science courses must focus on a non-English speaking culture
[5]Students must have demonstrated foreign language proficiency at the FL_102 level

CURRICULUM IN GEOLOGY, MARINE SCIENCES CONCENTRATION
Degree earned: B.S. in Geology

FRESHMAN YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
CH 101 Chemistry - A Molecular Science	3	CH 201Chemistry - A Quantitative Science	3
CH 102 General Chemistry Lab	1	CH 202 Quantitative Chemistry Lab	1
ENG 111 Comp. & Rhetoric	3	ENG 112 Comp. and Reading	3
MA 141 Calculus I	4	MA 241 Calculus II	4
MEA 101 Geology I:Physical	3	MEA 102 Geology II:Historical	3
MEA 110 Geology I Lab	1	MEA 111 Geology II Lab	1
Any 100-level PE in Fitness & Wellness[1]	1		**15**
PMS 100 Perspectives on Learning	1		
	17		

SOPHOMORE YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
MA 242 Calculus III	4	CSC 200 Intro. to Computers	3
MEA 200 Intro. to Oceanography	3	MEA 250 Intro. Coastal Environ.	3
MEA 210 Intro. to Oceanography Lab	1	MEA 440 Igneous and Meta. Petrol.	4
MEA 330 Mineralogy& Optical Mineralogy	5	PY 205 Physics Engr. & Sci.	4
History/Literature Elective[2]	3		**14**
	16		

JUNIOR YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
MEA 450 Sediment Petr. & Strat.	4	ENG 333 Comm. for Sci. & Researchers	3
MEA 473 Chemical Oceanography	3	MEA 451 Structural Geology	4
PY 208 Physics Engr. & Sci. II	4	Statistical Science Option[4]	3
Social Science Elective[2]	3	MEA Restricted Elective[3]	3
	14	Social Science Elective[2]	3
			16

SUMMER SESSION

MEA 465, 466, Geologic Field Camp I, II 6

SENIOR YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
MEA 411 Marine Sed. Transport	3	MEA 491 Senior Seminar	2
MEA 460 Intro. to Phys. Ocean	3	Phil., Relig. Vis/Perf. Arts Elective[6]	3
Geophysics Option[5]	3	History/Literature Elective[2]	3
Humanities/Social Science Elective[6]	3	Humanities/Social Science Elective[6]	3
MEA Restricted Elective[3]	3	MEA Restricted Elective[3]	3-4
	15		**14-15**

Minimum Hours Required for Graduation: **127**[7]

[1]Any Physical Education course at the 100 level.
[2]These courses must be selected from the approved GER Listings for Social Sciences and Humanities and must include the following: 6 Hours in History and/or Literature; 6 Hours representing *two* different areas in Economics, Political Science, Government, Sociology, Anthropology, and/or Cultural Geography.
At least *one* of the *total* selection of Social Sciences and Humanities courses must deal with a non-English speaking culture.
[3]MEA restricted elective to be selected from MEA 323, MEA 510, or any 400/500 level MEA course in Earth Science or Marine Science.
[4]Statistical Science Option to be selected from among ST 301, ST 361, and ST 371.

[5]To be selected from among MEA 470, MEA 471, or MEA 476.
[6]One of these courses to be selected from the approved GER Science, Technology and Society (Humanities & Soc. Sci. Perspectives) List.
[7]Graduation also requires foreign language proficiency at the FL_102 level.

MINOR IN GEOLOGY

The Department of Marine, Earth and Atmospheric Sciences offers a Minor in Geology to majors in any field except geology (GYA, GYM, & GYS). Admission to the program requires a grade of C or better in MEA 101 and MEA 110. Successful completion of the program requires a grade of C or better in at least 14 hours of geology courses beyond the first semester including at least two lab courses. Contact the department (515-7776) for added information and consultation with a minor advisor.

CURRICULUM IN METEOROLOGY

Degree earned: B.S. in Meteorology

FRESHMAN YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
CH 101 Chemistry - A Molecular Science[1]	3	CH 201Chemistry - A Quantitative Science[3]	3
CH 102 General Chemistry Lab	1	CH 202 Quantitative Chemistry Lab	1
ENG 111 Comp. & Rhetoric	3	ENG 112 Comp. & Reading	3
MA 141 Calculus I[1]	4	MA 241 Calculus II[1]	4
MEA 213 Fundamentals of Meteorology I	2	MEA 214 Fundamentals of Meteorology II	2
PMS 100 Orientation to PAMS	1	PY 205 Physics Engr. & Sci. I[1]	4
Any 100-level PE in Fitness & Wellness[2]	1		17
	15		

SOPHOMORE YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
MA 242 Calculus III	4	MA 341 Applied Diff. Equations I	3
MEA 311 The Global Atmosphere	3	MEA 312 Atmospheric Thermodynamics	3
MEA 313 Weather Measurements & Analysis I	1	MEA 314 Wthr Measurements & Analysis II	1
PY 208 Physics Engr. and Sci. II	4	Approved Elective[5]	3
Literature or History Elective[4]	3	Geophysical Science Elective[6]	3
Physical Education Elective	1	Literature or History Elective[4]	3
	16		16

JUNIOR YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
ENG 333 Comm. Sci. & Researchers	3	MEA 412 Atmospheric Physics	3
MEA 421 Atmospheric Dynamics I[1]	3	MEA 422 Atmospheric Dynamics II[1]	3
ST 380 Prob. & Stat. Phys. Sci.	3	Approved Elective[5]	3
Approved Elective[5]	3	Computer Prog. Option[7]	3
Humanities/Social Science Elective[4]	3	Restricted Elective[8]	3
	15		15

SENIOR YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
MEA 443 Synoptic Wthr Anal. & Forecasting	4	Approved Elective[5]	3
Approved Elective[5]	3	Phil., Relig., Vis/Perf. Arts Elective[4]	3
Humanities/Social Science Elective[4]	3	Restricted Electives[9]	6
Restricted Elective[9]	3	Sci., Technology & Soc. Elective[10]	3
Social Science Elective[4]	3		15
	16		

Minimum Hours Required for Graduation: **125[11]**

[1]Those courses for which a grade of 'C-' or higher is required..
[2]Any Physical Education course in Fitness & Wellness at the 100 level.
[3]Advanced transfer students are permitted to substitute mathematics, science or engineering credits for CH 201, 202.
[4]These courses must be selected from the approved GER Listings for Social Sciences and Humanities and must include the following: 6 Hours in History and/or Literature; 6 Hours representing two different areas in Economics, Political Science, Government, Sociology, Anthropology, and/or Cultural Geography; and 3 Hours in Philosophy, Religion or Visual & Performing Arts.
At least *one* of your *total* selection of Social Sciences and Humanities courses must deal with a non-English speaking culture
[5]Approved electives constitute a minor field of emphasis consisting of at least 15 credit hours in a single discipline or related disciplines. These include, but are not limited to: biometerology, chemistry, computer science, environmental quality, geology-geophysics,hydrology, mathematics, physics, physical oceanography, statistics; several areas of engineering, agriculture, forestry; science education, weather communication.
[6]Geophys. Sci. Elective is selected from among MEA 101, MEA 200, PY 123, PY 124, SSC 200.
[7]CSC 114 Into. to Computing C++ recommended but may substitute CSC 112 FORTRAN.
[8]MEA 405 Atmosphere Data Analysis or another course in meteorology at the 300 level or above.
[9]Any MEA course at the 400 level or above.
[10]This course should be taken from among those offered on the GER list from a Humanities and Social Science perspective.
[11]Students must have demonstrated foreign language proficiency at the FL_102 level.

CURRICULUM IN METEOROLOGY, MARINE SCIENCE CONCENTRATION
Degree earned: B.S. in Meteorology

FRESHMAN YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
CH 101 Chemistry - A Molecular Science[1]	3	CH 201Chemistry - A Quantitative Science	3
CH 102 General Chemistry Lab	1	ENG 112 Comp. and Reading	3
ENG 111 Comp. & Rhetoric	3	MA 241 Calculus II[1]	4
MA 141 Calculus I[1]	4	PY 205 Physics Engr. & Sci. I[1]	4
Any 100-level PE in Fitness & Wellness[2]	1	Physical Education Elective	1
PMS 100 Perspectives on Learning	1		**15**
Humanities/Social Science Elective[3]	3		
	16		

SOPHOMORE YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
MA 242 Calculus III	4	MA 341 Applied Diff. Equations I	3
MEA 200 Intro. Oceanography	3	MEA 312 Physical Meteorology	3
MEA 210 Intro. Oceanography Lab	1	MEA 314 Meteorology Lab II	1
MEA 311 Physical Climatology	3	Geophysical Science Elective[4]	3
MEA 313 Meteorology Lab I	1	Humanities/Social Science Elective[3]	3
PY 208 Physics Engr. & Sci. II	4	History/Literature Elective[3]	3
	16		**16**

JUNIOR YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
ENG 333 Comm. Sci. & Researchers.	3	MEA 405 Climatol Data Analysis	3
MEA 421 Atmospheric Dynamics I[1]	4	MEA 412 Atmospheric Physics	3
MEA 460 Intro. Physical Ocean	3	MEA 422 Atmospheric Dynamics II[1]	4
ST 380 Statistics for Phys Science	3	MEA 462 Observa. Mthds. and Data Analysis	3
	13	Computer Prog. Option[5]	3
			16

SENIOR YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
MEA 443 Weather Analysis & Forecast.I	3	MEA 467 Marine Meteorology	3
MEA 455 Micrometeorology	3	Humanities/Social Science Elective[3]	3
Approved Elective	3	Meteorology Technical Elective[7]	3
Sci., Technology, & Soc. Elective[6]	3	Phil., Relig., Vis/Perf. Arts Elective[3]	3
History/Literature Elective[3]	3	Free Elective	3
	15		**15**

Minimum Hours Required for Graduation: **122[8]**

[1]Those courses for which a grade of 'D' is not acceptable.
[2]Any Physical Education course at the 100 level.
[3]These courses must be selected from the approved GER Listings for Social Sciences and Humanities and must include the following: 6 Hours in History and/or Literature; 6 Hours representing two different areas in Economics, Political Science, Government, Sociology, Anthropology, and/or Cultural Geography; and 3 Hours in Philosophy, Religion or Visual & Performing Arts.
At least *one* of your *total* selection of Social Sciences and Humanities courses must deal with a non-English speaking culture.
[4]Geophys. Sci. Elective is selected from among MEA 101, PY 123, PY 124, SSC 200 and CE 200.
[5]CSC 114 C++ recommended but may substitute CSC 112 FORTRAN.
[6]This course should be taken from among those offered from a Humanities or Social Science perspective.
[7]Meteorology Technical Elective: MEA 444, MEA 464, MEA 512, or MEA 518.
[8]Graduation also requires foreign language proficiency at the FL_102 level.

MINOR IN METEOROLOGY

The Department of Marine, Earth and Atmospheric Sciences offers a Minor in Meteorology to majors in any field except meteorology. Admission to the program requires a grade of C or better in MA 141, 241, and 242 and in PY 205 and 208. Successful completion of the program requires a grade of C or better in at least 15 credit hours of meteorology courses at the 300 level or above. These courses must include courses MEA 421 and MEA 422. Other courses taken should be selected in consultation with meteorology faculty. Contact the department for information (515-7776).

CURRICULUM IN NATURAL RESOURCES, MARINE AND COASTAL RESOURCES CONCENTRATION
Degree earned: B.S. in Natural Resources

FRESHMAN YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
ENG 111 Comp. & Rhetoric[1]	3	BIO 125 General Biology	4
MA 131 Calculus Life & Mgmt Sciences A *or*	3	COM 110 Public Speaking	3
MA 141 Calculus I	4	ENG 112 Comp. & Reading	3
MEA 101 Geology I: Physical	3	MA 231 Calculus Life & Mgmt Sciences B *and*	3
MEA 110 Geology Lab	1	MA 132 Comput. Math Life Mgmt Sci. *or*	1
NR 100 Intro. to Natural Resources	2	MA 241 Calculus II	3
PE 100 Physical Education Elective[2]	1	MEA 130 Intro. to Weather and Climate	3
	13/14	MEA 135 Intro. to Weather and Climate Lab	1
			17/18

SOPHOMORE YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
CH 101 Chem. Molecular Science[3]	3	CH 201/202 Chem. Quant. Sci. & Quant. Lab *or*	4
CH 102 General Chemistry Lab	1	CH 220 Intro to Organic Chem.	
MEA 200 Intro. to Oceanography	3	EC 205 Fund. Economics	3
MEA 210 Intro. to Ocean Lab	1	MEA 220 Marine Biology	3
PE 253 Orienteering	1	MEA 250 Intro. Coastal Environment	3
ZO 150 Animal Diversity	4	MEA 251 Intro. Coastal Environment Lab	1
Political Science[4]	3	SSC 200 Soil Science	4
	16		**18**

JUNIOR YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
BO 360/365 Intro to Ecology and Ecology Lab *or*	4	MEA 323 Earth System Chem.	3
ZO (FW) 420 Fishery Science		MEA 469 Ecol. Coastal Resources	3
PY 211 (or 205) Physics I with Lab[1]	4	PY 212 (or 208) Physics II with Lab	4
ST 311 Intro to Statistics	3	Technical Elective[3]	3
Technical Writing[5]	3		**13**
	14		

SUMMER SESSION

MEA 459 Coastal Processes	6

SENIOR YEAR

Fall Semester	**Credits**	Spring Semester	**Credits**
ARE (EC) 336 Intro Res. & Env. Economics	3	MEA 480 Coastal Issues & Science Concepts[7]	3
PS 336 Global Environmental Politics	3	NR 400 Management Nat. Res.	4
ZO (FW) 420 Fishery Science	3	History/Literature Elective[6]	3
History/Literature Elective[6]	3	Humanities & Social Sciences Elective[6]	3
Phil. Rel. or Fine Arts Elective[6]	3		**13**
	14		
		Minimum Total Hours Required for Graduation	**126[8]**

[1]Those courses for which a C- or higher is required.
[2]Any Physical Education course at the 100 level.
[3]MEA ? or PRT 462
[4]PS 201 or PS 202
[5]ENG 331, or 332, or 333
[6]These courses must be selected form the approved GER listing for Social Sciences and Humanities as follows: 6 hours in History and/or Literature, 3 hours in Philosophy, Religion, or Fine Arts, and 3 hours form Political Sciences, Government, Sociology, and/or Cultural Geography. At least 3 of the total selection of 12 hours must deal with a non-English speaking culture.
[7]New course to be implemented
[8]Graduation also requires foreign language proficiency at the FL_102 level.

CURRICULUM IN ENVIRONMENTAL SCIENCES, ENVIRONMENTAL GEOLOGY CONCENTRATION
Degree earned: B.S. in Environmental Sciences

FRESHMAN YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
BIO 125 General Biology	4	CH 201/202 Chem.-A Quantitative Sci., Lab *or*	4
CH 101 Chemistry - A Molecular Science	3	CH 220 Intro to Organic Chemistry	
CH 102 General Chemistry I Lab	1	E 115 Intro. Computing Environ.	1
ENG 111 Comp. and Rhetoric	3	ENG 112 Comp. and Reading	3
MA 141 Calculus I	4	ES 100 Intro. to Environ. Science	3
Any 100-level PE in Fitness & Wellness[1]	1	MA 241 Calculus II	4
	16	Physical Education Elective	1
			16

SOPHOMORE YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
MA 242 Calculus III	4	MEA 200 Intro. to Oceanography	3
MEA 101 Geology I	3	MEA 210 Intro. to Oceanography Lab	1
MEA 110 Geology I Lab	1	MEA 410 Intro. to Geol. Materials	4
PY 205 Physics for Engr. & Sci. I	4	PY 208 Physics for Engr. & Sci. II	4
History/Literature Elective	3	Comm./Speech List Elective	3
	15		**15**

JUNIOR YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
ENG 333 Comm. for Sci. and Research	3	EC(ARE) 336 Intro. Res. & Environ. Econ.[4]	3
First Geologic Option[6]	3	MEA 451 Structural Geology	4
ST 3_ _Any 300-level ST course	3	Environmental Policy Option[5]	3
ZO 150 or BO 200 Biology Option	4	MEA 323 Earth System Chemistry	3
Economics List Elective[3]	3	Math/Statistics Option[7]	3
	16		**16**

SENIOR YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
MEA 481 Prin. of Geomorphology	3	ES 400 Environ. Science Project[14]	3
SSC 200 Soil Science	4	MEA 3_ _[8]	3
Second Geology Option[9]	3	History/Literature Elective[2]	3
Humanities/Social Science Elective[10]	3	Natural Science Option[12]	3
Supporting Technical Elective[11]	3	Phil., Relig., Vis/Perf. Arts Elective[2]	3
	16		**15**
		Minimum Hours Required for Graduation	**125[13]**

[1]Any Physical Education course at the 100 level.
[2]GER requires 6 hours from approved Literature and History Lists, plus 3 hours from Phil., Religion or Fine Arts List; at least one of these courses must also be from Non-English Speaking Cultures perspective.
[3]Option should satisfy prerequisite for EC 336.
[4]Also satisfies Science, Technology & Society requirement.
[5]Option of either PS 320 or PS 336.
[6]MEA 250/251 or any additional 300 or 400 level geology course or PRT 462.
[7]Option of either ST 302, MA 305, MA 341, or MA 405 (may substitute CH 220 for geochemistry focus, if CH 201/202 is taken).
[8]Option of any MEA 400 or 500 course or SSC 452.
[9]Option of any additional 400 or 500 level MEA course.
[10]Recommended: Environmental Ethics Course (e.g. PHI 322, MDS 201).
[11]Recommended selection from the following: (Advanced Soils) SSC 452; (Advanced Chemistry) CH 220, CH 331; (Data Management) ST 430, ST 445; (Land Surface Characterization) GC 120, GC 320, FOR 353, CE 507, PRT 462; (Other) MEA 311, FOR 401, FOR 472, LAR 430.
[12]Option of either MEA 130, FOR 252 or PY 124/125.
[13]Students must have demonstrated foreign language proficiency at the FL_ 102 level.
[14]New course to be implemented.

CURRICULUM IN ENVIRONMENTAL SCIENCES, AIR QUALITY CONCENTRATION
Degree earned: B.S. in Environmental Sciences

FRESHMAN YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
BIO 125 General Biology	4	ENG 112 Comp. and Reading	3
CH 101 Chemistry - A Molecular Science[1]	3	ES 100 Intro. Environ. Sci.	3
CH 102 General Chemistry Lab	1	MA 241 Calculus II[1]	4
ENG 111 Comp. & Rhetoric	3	PY 205 Physics for Engr. & Sci. I[1]	4
MA 141 Calculus I[1]	4		**14**
PAMS 100 Perspectives on Learning	1		
	16		

SOPHOMORE YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
CH 201 Chemistry - A Quantitative Science I[1]	3	MA 341 Applied Diff. Equations I	3
CH 202 Quantitative Chemistry Lab	1	MEA 312 Physical Meterology	3
MA 242 Calculus III	4	MEA 314 Meteorology Lab II	1
MEA 311 Physical Climatology	3	Biological Science Elective[2]	4
MEA 313 Meteorology Lab I	1	Computer Science Elective[3]	3
PY 208 Physics for Engr. & Sci. II	4	History/Literature Elective[4]	3
	16		**17**

JUNIOR YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
MEA 421 Atmospheric Dynamics I[1]	4	ENG 333 Comm. for Sci. & Research	3
ST 301 Statistics Methods I	3	MEA 422 Atmospheric Dynamics II	4
Chemistry Elective[6]	4	Chemistry Elective[6]	3
Humanities/Soc. Sci. Elective[4]	3	History/Literature Elective[4]	3
Any 100-level PE in Fitness & Wellness[5]	1	Statistics Elective[7]	3
	15		**16**

SENIOR YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
MEA 455 Micrometeorology	3	ARE(EC) 336 Resource Environ. Economics[11]	3
Physical Education Elective	1	ES 400 Environ. Sci. Project[14]	3
Economics Elective[9]	3	MEA 456 Air Quality	3
Natural Science Elective[10]	4	MEA 323 Earth System Chemistry	3
Comm. Elective[8]	3	Political Science Elective[12]	3
Phil., Relig., Vis/Perf. Arts Elective[4]	3		**15**
	17		

Minimum Hours Required for Graduation **126[13]**

[1]Those courses for which a grade of 'D' is not acceptable.
[2]Either BO 200 or ZO 150.
[3]Choose an Introduction to Programming Course. C++ is recommended.
[4]Course to be selected from list of General Education Requirements. At least one course must deal with a non-English speaking culture.
[5]Any Physical Education course at the 100 level.
[6]Choose either CH 315 and CH 331 or CHE 205 (4 cr., fall) and CHE 225 (3 cr., spring).
[7]Either ST 302 or 371.
[8]Either COM 110 or 112.
[9]Either EC 205 or ARE 201.
[10]Choose one course with a corequisite laboratory from among the following: MEA 101, 110; MEA 200, 210; either BO 360, 365 or ZO 260; SSC 200.
[11]This course satisfies the Science, Technology, and Society Requirement.
[12]Either PS 320 or 336.
[13]Students must have demonstrated foreign language proficiency at the FL_ 102 level.
[14]New course to be implemented.

MARINE SCIENCES CONCENTRATIONS IN PHYSICS
(See B.S. in Physics)

MARINE SCIENCES CONCENTRATIONS IN CHEMISTRY
(See B.S. in Chemistry)

DEPARTMENT OF MATHEMATICS

www.math.ncsu.edu

Harrelson Hall, Room 360
Phone: (919) 515-3796

R. H. Martin, Jr., *Head*
R. T. Ramsay, *Associate Head, Director of Undergraduate Programs and Coordinator of Advising*
J. R. Griggs, *Coordinator of Classroom Instruction*
H. J. Charlton, *Scheduling Officer and Director of Summer School*

Professors: H.T. Banks, J.W. Bishir, E.E. Burniston, S.L. Campbell, R.E. Chandler, M.T. Chu, E.N. Chukwu, L.O. Chung, J. D. Cohen, J.C. Dunn, A. Fauntleroy, J.E. Frank, R.O. Fulp, R.E. Hartwig, I. Ispen, K. Ito, E.L. Kaltofen, C.T. Kelley, K. Koh, J.R. Kolb, X.-B. Lin, J. Luh, J.A. Marlin, R.H. Martin, C.D. Meyer, K. Misra, C.V. Pao, E.L. Peterson, M.S. Putcha, S. Schecter, J.F. Selgrade, M. Shearer, C.E. Siewert, J.W. Silverstein, M.F. Singer, E.L. Stitzinger, R.E. White; *Adjunct Professor:* R.J. Plemmons; *Professors Emeriti:* J.M.A. Danby, L.B. Martin, N.J. Rose; *Associate Professors:* G.D. Faulkner, J.-P. Fouque, D.E. Garoutte, A. Helminck, P. Hitczenko, H. Hong, N. Jing, A. Kheyfets, T.J. Lada, D.M. Latch, L.K. Norris, L.B. Page, R.T. Ramsay, J. Rodriguez, J.S. Scroggs, F.H.H. Semazzi, R. Silber, R. Smith, H.T. Tran, W.M. Waters; *Associate Professor Emeritus:* R.G. Savage, *Assistant Professors:* D. Brown, H.J. Charlton, P. Gremaud, S.O. Paur; *Assistont Professor Emeritus:* D.H. Hansen; *Lecturers:* J.R. Griggs, M.S. McCollum

The undergraduate majors in mathematics and applied mathematics provide a core of basic mathematics courses along with flexible choices of electives which permit both a well-rounded education and preparation for math-related careers. Because of the current employment market (for both baccalaureate and graduate students), students are advised to give serious consideration to the applied mathematics program.
Career objectives can be directed toward employment in math-related jobs in business industry or government, teaching at the secondary school level, or graduate study in mathematics and/or related areas.

FACILITIES AND LABORATORIES
The Mathematics Department operates a Multi-Media Center which incorporates an Audio Visual Center, Tutorial Room, Undergraduate Mathematics Computer Lab and a Computer Classroom. Using video systems, students can access a lecture which was missed or can see a lecture again for emphasis or clarification. Teaching assistants of the Mathematics Department are also available in the center for tutoring services.

The computer lab contains a total of thirty-eight Sun workstations which students use with MAPLE, a computer algebra system. These computers are also used for general internet access and for completion of electronic assignments (WebAssign) used in a number of math courses at NCSU. The Computer Classroom contains twenty Sun workstations.

In addition, Harrelson 314 is a multipurpose computer lab/classroom. The facility has outlets for ninety-seven computers. Currently fifty-one Dell laptop computers running Windows NT are installed. The instructor in the facility uses a Dell workstation and an NEC ceiling mounted projector which can display the instructor's screen to the entire classroom. The classroom can accommodate 100 students.

At this time, the center has video tapes of most of our basic courses, including MA 103, MA 105, MA 107, MA 111, MA 114, MA 121, MA 131, MA 141, MA 231, MA 241, MA 242, MA 301 and MA 501.

The Director of the center is Dr. L. B. Page. The center supervisor is Denise Seabrooks. The center is open seventy-one hours per week and is located in Harrelson Hall.

STUDENT ACTIVITIES

The Society for Undergraduate Mathematics is a club for all students interested in mathematics, and is a Student Chapter of the Mathematical Association of America. Club activities include monthly meetings and participation in regional and national professional activities.

Undergraduates in the Mathematics Department can participate in research programs with members of our faculty. In addition, many mathematics majors participate in off-campus programs, such as the NSF sponsored Research Experience for Undergraduates and the Budapest Semester in Mathematics.

Finally, undergraduate mathematics majors can participate in local, regional and national mathematics contests. Many of our students perform well in these contests, and several have received national recognition.

HONORS AND AWARDS

The department recognizes its superior students with the following annual awards:

Math Fellowship Program-A monetary award and work guarantees for several of the most qualified entering freshmen.
Hubert V. and Mary Alice Park Scholarship-An award made to an outstanding rising junior or senior in mathematics.
John W. Cell Scholarships-An award for an outstanding rising junior or senior in mathematics.
Carey Mumford Scholarship-An award to an outstanding sophomore, junior or senior in mathematics.
Levine-Anderson Award-An award for that student who has the best performance in the William Lowell Putnam Examination. (This award is not restricted to mathematics majors).
Charles N. Anderson Scholarship-An award for an outstanding sophomore in mathematics.
Charles F. Lewis Scholarship-An award for an outstanding senior who is a double major in mathematics/mathematics education.
Mrs. Roberts C. Bullock Scholarship-An award for an outstanding mathematics major who has also demonstrated an interest in the English language.
Dr. Rebecca R. Bullock Memorial Scholarship Endowment-An award for an outstanding mathematics major who has also demonstrated an interest in the English language.
Howard A. Petrea Scholarship-An award for an outstanding junior or senior in mathematics.

The department also has a chapter of the National Mathematical Honorary Fraternity Pi Mu Epsilon. Membership is open to those students with superior performance in mathematics courses. Professor Robert Silber is currently the faculty advisor.

MINOR IN MATHEMATICS

The Department of Mathematics offers a minor in mathematics to majors in any field except mathematics or mathematics education. The minor program consists of successful completion with a grade of C or better of any five three-semester-hour courses selected from among MA 225, or MA 222, but not both, and any mathematics courses numbered 300 or above (following the guidelines for credit).

CURRICULUM IN MATHEMATICS

Degree earned: B.S. in Mathematics

FRESHMAN YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
CH 101 Chemistry - A Molecular Science	3	CSC 110, CSC 112 or CSC 114	3
CH 102 General Chemistry Lab	1	ENG 112 Comp. and Reading	3
ENG 111 Comp. and Rhetoric	3	MA 241 Analytic Geom. & Calculus II	4
MA 141 Analytic Geom. & Calculus I	4	Sci./Math-Related Elective	3
History Elective	3	Social Science Elective[2]	3
Any 100-level PE in Fitness & Wellness[1]	1		16
	15		

SOPHOMORE YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
MA 225 Structure of the Real Numbers	3	MA 341 or MA 351	3
MA 242 Analytic Geom. & Calculus III	4	MA 407 Intro. to Modern Algebra	3
PY 205 Physics for Scientists I	4	PY 208 Physics for Scientists II	4
Literature Elective	3	Phil., Relig., Vis/Perf. Arts Elective	3
Physical Education Elective	1	Sci./Math-Related Elective	3
	15		16

JUNIOR YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
MA 405 Intro. to Linear Algebra	3	MA 421[3] Intro. to Probability	3
MA 425 Mathematical Analysis I	3	Math. Elective	3
Sci./Math-Related Elective	3	Sci./Math-Related Elective	3
Social Science Elective[2]	3	Writing/Speaking Elective	3
Free Elective	3	Free Elective	3
	15		**15**

SENIOR YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
Math. Elective	3	Humanities/Social Science Electives	6
Math. Elective	3	Math. Electives	6
Sci., Technology & Soc. Elective	3	Free Elective	3
Free Electives	6		**15**
	15		

Minimum Hours Required for Graduation: **122[4,5]**

[1]The two PE credits must include one Fitness and Wellness course.
[2]Chosen from two different content areas on the approved list of courses.
[3]ST 371 & ST 372 are an alternative to MA 421. If ST 371 & ST 372 are chosen, ST 372 is counted as one of the Science or Math-Related electives.
[4]Students must take an advanced two-course sequence in some important area of mathematics. One elective course must focus on a non-English-speaking culture. Students must demonstrate foreign language proficiency at the FL_102 level.
[5]Grades of D are not accepted in any required mathematics course numbered below 400 and only one D grade is permitted in mathematics courses numbered 400 or above. D grades are not acceptable in ENG 111 and ENG 112. At most, one D grade is acceptable among the following: CH 101, CSC 110, CSC 112, CSC 114, PY 205, PY 208, MA 421 (or ST 371).

CURRICULUM IN APPLIED MATHEMATICS
Degree earned: B.S. in Applied Mathematics

FRESHMAN YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
CH 101 Chemistry - A Molecular Science	3	CSC 110, CSC 112 or CSC 114	3
CH 102 General Chemistry Lab I	1	ENG 112 Comp. and Reading	3
ENG 111 Comp. and Rhetoric	3	MA 241 Analytic Geom. & Calculus II	4
MA 141 Analytic Geom. & Calc.	4	Phil., Relig., Vis/Perf. Arts Elective	3
History Elective	3	Social Science Elective[2]	3
Any 100-level PE in Fitness & Wellness[1]	1		
	15		**16**

SOPHOMORE YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
MA 225 Structure of the Real Numbers	3	MA 341 or MA 351	3
MA 242 Analytic Geom. & Calculus III	4	MA 405 Intro. to Linear Algebra	3
PY 205 Physics for Scientists I	4	PY 208 Physics for Scientists II	4
ST 371[3] Intro. to Probability	3	ST 372[3] Intro. to Statistics	3
Physical Education Elective	1	Literature Elective	3
	15		**16**

JUNIOR YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
MA 407 Intro. to Modern Algebra	3	Applied Elective	3
MA 425 Mathematical Analysis I	3	Mathematical Modeling Elective	3
Applied Elective	3	Mathematics Elective	3
Social Science Elective[2]	3	Writing/Speaking Elective	3
Free Elective	3	Free Elective	3
	15		**15**

SENIOR YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
Applied Electives	6	Applied Elective	3
Mathematics Elective	3	Humanities/Social Science Electives	6
Sci., Technology & Soc. Elective	3	Mathematics Elective	3
Free Elective	3	Free Elective	3
	15		**15**

Minimum Hours Required for Graduation: **122[4,5]**

[1]The two PE credits must include one Fitness and Wellness course.
[2]Chosen from two different content areas on the approved list of courses.
[3]Alternatives to the sequence ST 371-371 are the sequences ST 421-422 or MA 421-ST 380.
[4]Students must take an advanced two-course sequence in some important area of mathematics. One elective course must focus on a non-English-speaking culture. Students must demonstrate foreign language proficiency at the FL_102 level
[5]Grades of D are not accepted in any required mathematics course numbered below 400 and only one D grade is permitted in mathematics courses numbered 400 or above. D grades are not acceptable in ENG 111 and ENG 112. At most, one D grade is acceptable among the following: CH 101, CSC 110, CSC 112, CSC 114, PY 205, PY 208, ST 371, ST 372.

DEPARTMENT OF PHYSICS

www.physics.ncsu.edu

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Phone: (919) 515-2521

C. R. Gould, *Head*
S. P. Reynolds, *Coordinator of Advising*

University Professor: G. Lucovsky; *Alumni Distinguished Graduate Professor:* G.E. Mitchell; *Alumni Distinguished Undergroduate Professors:* C.R. Gould, D.G. Haase, C.R. Ji, R.R. Patty; *Professors:* D.E. Aspnes, J. Bernholc, K.T. Chung, J.W. Cook, S.R. Cotanch, D.C. Ellison, R.E. Fornes, C.R. Gould, D.G. Haase, C.E. Johnson, K.L. Johnston, J. Krim, F. Lado Jr., G. Lucovsky, J.D. Memory, G.E. Mitchell, J.R. Mowat, R.J. Nemanich, M.A. Paesler, J.Y. Park, S.P. Reynolds, J.S. Risley, D.E. Sayers, J.F. Schetzina, P.J. Stiles, D.R. Tilley; *Adjunct Professors:* M Dutta, R.V. Janssens, J.E. Rowe, M.A. Stroscio, J.F. Wilkerson; *Professors Emeriti:* W.R. Davis, W.O. Doggett, G.L. Hall, A.W. Jenkins, G.H. Katzin, E.R. Manring, R.R. Patty, L.W. Seagondollar, D.R. Tilley; *Associate Professors:* H. Ade, R.J. Beichner, J.M. Blondin, M.A. Klenin, G.W. Parker, C.M. Rowland; *Adjunct Associate Professors:* P. Bogvslawski, J.F. Shriner Jr.; *Associate Professosr Emeriti:* C.G. Cobb, D.H. Martin; *Assistant Professors:* J.D. Brown, H.O. Hallen, E.S. Swanson; *Assistant Professor Emeritus:* H.L. Owen; *Adjunct Assistant Professors:* G.E. Bulman, E.F. Moore, L.S. Plano, J.W. Spence; *Associate Members of the Department:* J.M.A. Danby (Mathematics), R.M. Kolbas (ECE), L.K. Norris (Mathematics), J.C. Park (Mathematics, Science, and Technology Education), D.L. Ridgeway (Statistics), E. C. Theil (Biochemistry).

Physics is the fundamental science of observation, measurement and description of the natural world. Physicists seek to establish a mathematical description of all physical phenomena, ranging from the interactions of quarks in nuclei to the collisions of galaxies in the Universe. Together with scientists in engineering and other physical, biological, and mathematical sciences, physicists collaborate to develop new materials and new insights in all areas of modern science and technology.

CURRICULA

The Physics undergraduate curriculum provides a strong background in the fundamentals, and provides course options which allow deeper study in areas of selected interest. Undergraduates have the opportunity to work in research laboratories with faculty in the following research areas: astrophysics, atomic physics, physics education, marine physics, nuclear and particle physics, synchrotron radiation, near-field optics, materials physics, solid-state and condensed-matter physics. Undergraduates are frequently co-authors on scientific papers. Physics majors are part of a close-knit community - a small, highly motivated group of people who have wide-ranging interests and a passion for solving problems.

THE BACHELOR OF SCIENCE IN PHYSICS degree is broad based, and students can go on to technical careers at the bachelors level, or go to graduate school in Physics or other fields.

THE MARINE SCIENCES CONCENTRATION, available within the B.S. in Physics program, introduces students to the dynamics of ocean circulation systems, and provides an excellent preparation for either graduate student or entry-level positions in government agencies or industry.

THE MATERIALS SCIENCE CONCENTRATION, available within the B.S. in Physics program, introduces students to Materials Science and provides an excellent preparation for either graduate study or entry level positions in industry. The program emphasizes a fundamental broad-based knowledge of materials and materials physics.

THE COMPUTATIONAL PHYSICS CONCENTRATION, available within the B.S. in Physics program, provides students with a strong background in physics, mathematics, and computational science. Together, these skills will enable the student to model and explore a wide range of interdisciplinary problems in a research or industrial environment.

THE BACHELOR OF ARTS IN PHYSICS program offers a flexible course of studies for students who may not plan to become professional physicists but who desire an interdisciplinary program with a strong emphasis on physics. The proper choice of electives will help to prepare the graduate for professional careers in education, law, business, journalism, or graduate school in an allied science. It is especially suitable for double majors. Since the first three semesters are essentially identical to those of the B.S. program, students may enter the B.A. program either directly from high school or at some later point after entering the university.

HONORS PROGRAM

The Physics Department Honors Program offers students the opportunity to develop their academic potential by increased involvement and participation in physics study and research. A minimum GPA of 3.500 in physics courses and overall GPA of 3.000 is required for admission. Students must complete three (3) hours of PY 499, Independent Research, and submit a written scientific report based on the student's research. Students must also complete an additional nine (9) hours of upper-level physics courses drawn from the following two categories: 300 and 400 level physics courses taken with the faculty-initiated honors option and, 500 level physics.

CURRICULUM IN PHYSICS
Degree earned: B.S. in Physics

FRESHMAN YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
ENG 111 Comp. & Rhetoric	3	CH 101 Chemistry - A Molecular Science	3
MA 141 Calculus I	4	CH 102 General Chemistry Lab	1
PY 201 General Physics[1]	4	ENG 112 Comp. & Reading	3
PMS 100 Perspectives on Learning	1	MA 241 Calculus II	4
Humanities/Social Science Elective[2]	3	PY 202 General Physics[1]	4
	15	Any 100-level PE in Fitness & Wellness[3]	1
			16

SOPHOMORE YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
CH 201 Chemistry - A Quantitative Science	3	MA 341 Applied Diff. Equations I	3
CH 202 Quantitative Chemistry Lab	1	PY 413 Thermal Physics	3
MA 242 Calculus III	4	ST 380 Prob. and Stat. for the Physical Sciences[4]	3
PY 203 General Physics[1]	4	Humanities/Social Science Elective[2]	3
Humanities/Social Science Elective[2]	3	Free Elective	3
Physical Education Elective[3]	1		**15**
	16		

JUNIOR YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
MA 401 Applied Diff. Equations II	3	ENG 333 Comm. for Sci. & Engr.[5]	3
PY 411 Mechanics I	3	PY 412 Mechanics II	3
PY 414 Electromagnetism	3	PY 415 Electromagnetism II	3
Humanities/Social Science Elective[2]	3	Humanities/Social Science Elective[2]	3
Free Elective	3	Free Elective	3
	15		**15**

SENIOR YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
PY 401 Quantum Physics I	3	PY 402 Quantum Physics II	3
PY 452 Advanced Physics Lab	3	Humanities/Social Science Elective[2]	3
Computing/Num. Methods[6]	3	Technical Elective[7]	3
Humanities/Social Science Elective[2]	3	Technical Elective[7]	3
Technical Elective[7]	3	Technical Elective[7]	3
	15		**15**

Minimum Hours Required for Graduation: **122**

[1]Students may substitute PY 205 for PY 201, PY 208 for PY 202, and PY 407 for PY 203. However, they must take the lab section of PY 203 if they elect to take PY 407.
[2]The General Education requirement consists of seven courses (21 hrs) chosen from the University approved lists as follows: two courses in history/literature, one course in philosophy, religion or the arts; two courses in psychology, economics, politics, sociology, anthropology or cultural geography; and two courses in any humanities/social sciences discipline. One of the courses must focus on a non-English speaking culture. One of the courses must focus on science, technology and society.
Foreign language proficiency at the FL 102 level is required for graduation.
[3] One of the PE courses must be at the 100 level in Fitness and Wellness. PE may be taken for credit-only (S/U) grading.
[4]ST 370 is an acceptable substitute for ST 380.
[5]Students may substitute any Advanced Writing Course on the University approved GER list for ENG 333.
[6]Computing and numerical methods are discussed extensively in MA(CSC) 427, CSC 302, and PY 525, all of which are acceptable courses.
[7]Technical electives are courses at the 300 level or above in physical, mathematical and biological sciences, and in engineering.

CURRICULUM IN PHYSICS
Degree earned: B.A. in Physics

FRESHMAN YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
ENG 111 Comp. & Rhetoric	3	CH 101 Chemistry - A Molecular Science	3
MA 141 Calculus I	4	CH 102 General Chemistry Lab	1
PY 201 General Physics[1]	4	ENG 112 Comp. & Reading	3
PMS 100 Perspectives on Learning	1	MA 241 Calculus II	4
Humanities/Social Science Elective[2]	3	PY 202 General PhysicsII[1]	4
	15	Any 100-level PE in Fitness & Wellness[3]	1
			16

SOPHOMORE YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
CH 201 Chemistry - A Quantitative Science	3	MA 341 Applied Diff. Equations I	3
CH 202 Quantitative Chemistry Lab	1	ST 380 Prob. and Stat. for the Physical Sci. [4]	3
MA 242 Calculus III	4	PY 413 Thermal Physics	3
PY 203 General Physics III[1]	4	Humanities/Social Science Elective[2]	3
Humanities/Social Science Elective[2]	3	Humanities/Social Science Elective[2]	3
Physical Education Elective[3]	1		**15**
	16		

JUNIOR YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
PY 411 Mechanics I	3	ENG 333 Science Writing [5]	3
PY 414 Electromagnetism	3	Restricted Elective [6]	3
Humanities/Social Science Elective[2]	3	Restricted Elective [6]	3
Free Elective	3	Humanities/Social Science Elective[2]	3
Free Elective	3	Humanities/Social Science Elective[2]	3
	15		**15**

SENIOR YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
PY 401 Quantum Physics I	3	PY 402 Quantum Physics II	3
PY 452 Advanced Physics Lab	3	Humanities/Social Science Elective[2]	3
Computing/Num. Methods[7]	3	Free Elective	3
Humanities/Social Science Elective[2]	3	Restricted Elective [6]	3
Restricted Elective [6]	3	Restricted Elective [6]	3
	15		**15**

Minimum Hours Required for Graduation: 122

[1]Students may substitute PY 205 for PY 201, PY 208 for PY 202, and PY 407 for PY 203. However, they must take the lab section of PY 203 if they elect to take PY 407.
[2]The General Education requirement consists of seven courses (21 hrs) chosen from the University approved lists as follows: two courses in history/literature, one course in philosophy, religion or the arts; two courses in psychology, economics, politics, sociology, anthropology or cultural geography; and two courses in any humanities/social sciences discipline. One of the courses must focus on a non-English speaking culture. One of the courses must focus on science, technology and society. Foreign language proficiency at the FL_102 level is required for graduation.
Foreign language proficiency at the FL 102 level is required for graduation.
[3]One of the PE courses must be at the 100-level in Fitness and Wellness. PE may be taken for credit-only (S/U) grading.
[4]ST 370 is an acceptable substitute for ST 380.
[5]Students may substitute any Advanced Writing Course on the GER list for ENG 333.
[6]Restricted electives are courses at the 300 level or above in physical, mathematical and biological sciences, in engineering, and in mathematics and science education. Other courses at the 300 level or above with quantitative content may be included at the discretion of the advisor.
[7]Computing and numerical methods are discussed extensively in MA(CSC) 427, CSC 302, and PY 525, all of which are acceptable courses.

CURRICULUM IN PHYSICS, MARINE SCIENCES CONCENTRATION
Degree earned: B.S. in Physics

FRESHMAN YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
ENG 111 Comp. & Rhetoric	3	CH 101 Chemistry - A Molecular Science	3
MA 141 Calculus I	4	CH 102 General Chemistry Lab	1
PY 201 General Physics[1]	4	ENG 112 Comp. & Reading	3
PMS 100 Perspectives on Learning	1	MA 241 Calculus II	4
Humanities/Social Science Elective[2]	3	PY 202 General Physics[1]	4
	15	Any 100-level PE in Fitness & Wellness[3]	1
			16

SOPHOMORE YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
CH 201 Chemistry - A Quantitative Science	3	CSC 112 Intro. to FORTRAN Programming	3
CH 202 Quantitative Chemistry Lab	1	E 115 Computer Orientation	1
MA 242 Calculus III	4	MA 341 Applied Diff. Equations I	3
MEA 200 Intro. to Oceanggraphy	3	PY 413 Thermal Physics	3
MEA 210 Intro. to Oceanography Lab	1	ST 380 Prob. and Stat. for the Physical Sci.[4]	3
PY 203 General Physics[2]	4	Humanities/Social Science Elective[2]	3
Physical Education Elective[3]	1		**16**
	17		

JUNIOR YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
MA 401 Applied Diff. Equations II	3	ENG 333 Comm. for Sci. & Engr.[5]	3
MEA 311 Physical Climatology	3	MEA 462 Observation Meth. & Data Analysis	3
MEA 460 Intro. Physical Ocean	3	PY 412 Mechanics II	3
PY 411 Mechanics I	3	Humanities/Social Science Elective[2]	3
Humanities/Social Science Elective[2]	3	Humanities/Social Science Elective[2]	3
	15		**15**

SENIOR YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
MEA 473 Prin. of Chemical Oceanography	3	MEA 464 Ocean Circulation Systems	3
MEA/PY 463 Fluid Physics	3	MEA 467 Marine Meteorology	3
PY 414 Electricity & Magnetism I	3	PY 402 or Technical Elective[6]	3
PY 401 or Technical Elective[6]	3	PY 415 Electromagnetism II	3
Humanities/Social Science Elective[2]	3	Humanities/Social Science Elective[2]	3
	15		**15**

Minimum Hours Required for Graduation: 124

[1]Students may substitute PY 205 for PY 201, PY 208 for PY 202, and PY 407 for PY 203. However, they must take the lab section of PY 203 if they elect to take PY 407.
[2]The General Education requirement consists of seven courses (21 hrs) chosen from the University approved lists as follows: two courses in history/literature, one course in philosophy, religion or the arts; two courses in psychology, economics, politics, sociology, anthropology or cultural geography; and two courses in any humanities/social sciences discipline. One of the courses must focus on a non-English speaking culture. One of the courses must focus on science, technology and society. Foreign language proficiency at the FL 102 level is required for graduation.
[3] One of the PE courses must be at the 100 level in Fitness and Wellness. PE may be taken for credit-only (S/U) grading.
[4]ST 370 is an acceptable substitute for ST 380.
[5]Students may substitute any Advanced Writing Course on the University approved GER list for ENG 333.
[6]Technical electives are courses at the 300 level or above in physical, mathematical, and biological sciences, and in engineering.

CURRICULUM IN PHYSICS, MATERIAL SCIENCES CONCENTRATION
Degree earned: B.S. in Physics

FRESHMAN YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
ENG 111 Comp. & Rhetoric	3	CH 101 Chemistry - A Molecular Science	3
E 115 Intro. to Computing Environ.	1	CH 102 General Chemistry Lab	1
MA 141 Calculus I	4	ENG 112 Comp. & Reading	3
PY 201 General Physics [1]	4	MA 241 Calculus II	4
PMS 100 Perspectives on Learning	1	PY 202 General Physics [1]	4
Humanities/Social Science Elective[2]	3	Any 100-level PE in Fitness & Wellness[3]	1
	16		**16**

SOPHOMORE YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
CH 202 Chemistry - A Quantitative Science	3	CSC 112/114 Intro. FORTRAN/C++	3
CH 202 Quantitative Chemistry Lab	1	MAT 210 Expr. in Materials Engr.	2
MA 242 Calculus III	3	MAT 301 Equil. and Rate Processes	3
MAT 201 Struc. & Prop. Engr. Materials	4	MA 341 Applied Diff. Equations I	3
PY 203 General Physics[1]	4	ST 380 Prob. and Stat. for the Physical Sci.[4]	3
	15	Humanities/Social Science Elective[2]	1
			17

JUNIOR YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
MAT 310 Computer Usage in Materials	2	ENG 333 Comm for Sci. & Engr. [5]	3
MAT 330 Crystal Chemistry & Phase Equil.	3	MAT 321 Phase Transf. & Diffusion	3
PY 411 Mechanics I	3	PY 415 Electromagnetism II	3
PY 414 Electromagnetism I	3	Restricted Elective[6]	3
Humanities/Social Science Elective[2]	3	Humanities/Social Science Elective[2]	3
Physical Education Elective[3]	1		**15**
	15		

SENIOR YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
PY 401 Modern & Quantum Physics I	3	MAT 331 Electronic Properties of Materials	3
Restricted Elective[6]	3	PY 402 Modern & Quantum Phys. II	3
Restricted Elective[6]	3	Restricted Elective[6]	3
Humanities/Social Science Elective[2]	3	Restricted Elective[6]	3
Humanities/Social Science Elective[2]	3	Humanities/Social Science Elective[2]	3
	15		**15**

Minimum Hours Required for Graduation: 124

[1] Students may substitute PY 205 for PY 201, PY 208 for PY 202, and PY 407 for PY 203. However, they must take the lab section of PY 203 if they elect to take PY 407.
[2]The General Education requirement consists of seven courses (21 hrs) chosen from the University approved lists as follows: two courses in history/literature, one course in philosophy, religion or the arts; two courses in psychology, economics, politics, sociology, anthropology or cultural geography; and two courses in any humanities/social sciences discipline. One of the courses must focus on a non-English speaking culture. One of the courses must focus on science, technology and society. Foreign language proficiency at the FL 102 level is required for graduation.
[3] One of the PE courses must be at the 100 level in Fitness and Wellness. PE may be taken for credit-only (S/U) grading.
[4]ST 370 is an acceptable substitute for ST 380.
[5]Students may substitute any Advanced Writing Course on the University approved GER list for ENG 333.
[6] Restricted electives are PY or MAT courses at the 300 level or higher. Students must choose either PY 452 or MAT 424.

CURRICULUM IN PHYSICS, COMPUTATIONAL PHYSICS CONCENTRATION
Degree earned: B.S. in Physics

FRESHMAN YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
ENG 111 Composition & Rhetoric	3	CH 101 Chemistry – A Molecular Science	3
MA 141 Analytic Geometry & Calculus I	4	CH 102 General Chemistry Lab	1
PY 201 General Physics[1]	4	ENG 112 Composition & Reading	3
PMS 100 Perspectives on Learning	1	MA 241 Analytic Geometry & Calculus II	4
Humanities/Social Science Elective[2]	3	PY 202 General Physics[1]	4
	15	Any 100-level PE in Fitness & Wellness[3]	1
			16

SOPHOMORE YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
CH 201 Chemistry – A Quantitative Science	3	MA 341 Applied Differential Equations I	3
CH 202 Quantitative Chemistry Lab	1	PY 413 Thermal Physics	3
MA 242 Analytic Geometry & Calculus III	4	MA 405 Linear Algebra	3
PY 203 General Physics[1]	4	Humanities/Social Science Elective[2]	3
CSC 114 Intro. to Computing	3	CSC 302 Intro. to Numerical Methods	3
Physical Education Elective[3]	1		**15**
	16		

JUNIOR YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
MA 401 Applied Differential Equations II	3	ENG 333 Comm. for Sci. & Engineering[5]	3
PY 411 Mechanics I	3	PY 412 Mechanics II	3
PY 414 Electromagnetism I[4]	3	PY 415 Electromagnetism II[4]	3
CSC 210 Programming Concepts	3	Humanities/Social Science Elective[2]	3
Humanities/Social Science Elective[2]	3	Free Elective	3
	15		**15**

SENIOR YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
PY 401 Quantum Physics I	3	PY 402 Quantum Physics II	3
Advanced Numerical Methods[6]	3	PY 452 Advanced Physics Lab	3
MA 402 Computational Methods	3	Free Elective	3
Humanities/Social Science Elective[2]	3	Humanities/Social Science Elective[2]	3
Free Elective	3	Humanities/Social Science Elective[2]	3
	15		**15**

Minimum total hours required for graduation: 122

[1]Students May substitute PY 205 for PY 201, PY 208 for PY 202, and PY 407 for PY 203; however, the lab section of PY 203 must be taken if PY 407 is elected.
[2]The General Education requirement consists of seven courses (21 hrs) chosen from the University approved lists as follows: two courses in history/literature, one course in philosophy, religion or the arts; two courses in psychology, economics, politics, sociology, anthropology or cultural geography; and two courses in any humanities/social sciences discipline. One of the courses must focus on a non-English speaking culture. One of the courses must focus on science, technology and society. Foreign language proficiency at the FL 102 level is required for graduation.
[3]One of the PE courses must be at the 100 level in Fitness & Wellness. PE may be taken for credit-only (S/U) grading.

[4]The PY 414/415 sequence may be taken during the senior year to allow time for other CSC courses that may be prerequisites for courses taken in the senior year.
[5]Students may substitute any Advance Writing Course on the University approved GER list for ENG 333.
[6]Advanced numerical methods are discussed extensively in MA(CSC)427 and PY 525, both of which are acceptable courses.

MINOR IN PHYSICS
The Physics Department offers a minor in physics to majors in any field except physics. To complete the minor 17 hours of specified physics courses are required, consisting of PY 205, 208, 407 (or 201, 202, 203) and two of PY 328, 341, 411, 412, 413, 414, 415.

DEPARTMENT OF STATISTICS

www.stat.ncsu.edu

Cox Hall, Room 110
Phone: (919) 515-2528

T. M. Gerig, *Head*
S. G. Pantula, *Director of Graduate Programs for Statistics*
K. H. Pollock, *Director of Biomathematics Graduate Program*
W. H. Swallow, *Director of Undergraduate Programs*

William Neal Reynolds Professor B. S. Weir; *Alumni Distinguished Graduate Professor* B. B. Bhattacharyya; *Professors:* R. L. Berger, P. Bloomfield, D. D. Boos, C. Brownie, D. A. Dickey, E. J. Dietz, S. P. Ellner, T. M. Gerig, F. Giesbrecht, T. Johnson, J. F. Monahan, D. W. Nychka, S. G. Pantula, K. H. Pollock, D. L. Ridgeway, D. L. Solomon, L. A. Stefanski, W. H. Swallow, J. L. Wasik; *Adjunct Professors:* J. R. Chromy, J. H. Goodnight, P. D. Haaland, N. Kaplan; *Professors Emeriti:* H. J. Gold, A. H. E. Grandage, R. J. Hader, D. W. Hayne, D. D. Mason, R. J. Monroe, L. A. Nelson, C. H. Proctor, C. P. Quesenberry, J. O. Rawlings, J. A. Rigney, R. G. D. Steel, H. R. van der Vaart, O. Wesler; *Associate Professors:* M. Davidian, M. L. Gumpertz, J. C. Lu, T. W. Reiland, C. E. Smith; *Research Associate Professor:* S. B. Zeng; *Associate Professor Emeritus:* A. C. Linnerud;*Assistant Professors:* S. K. Ghosh, J. M. Hughes-Oliver, T. B. Kepler, J. L. Thorne, W. A. Wang; *Adjunct Assistant Professor:* M. A. O'Connell; *Assistant Professor Emeritus:* B. J. Stines; *Senior Statistician:* S. B. Donaghy; *Research Assistant Statisticians:* C. J. Basten, J. M. Bay; *Teaching Laboratory Supervisor:* J. T. Arnold; *Associate Members of the Statistics Faculty:* W. R. Atchley (Genetics), T. H. Emigh (Genetics), M. M. Goodman (Crop Science), A. R. Hall (Economics), M. W. Suh (Textiles); *Associate Members of the Biomathematics Faculty:* H. T. Banks (Mathematics), J. W. Bishir (Mathematics), B. G. Fitzpatrick (Mathematics), J. F. Gilliam (Zoology), M. J. Groom (Zoology), G. R. Hess (Forestry), T. Johnson (Economics), D. W. Nychka (Statistics), H. E. Schaffer (Genetics), J. F. Selgrade (Mathematics), R. E. Stinner (Entomology), H. T. Tran (Mathematics), G. G. Wilkerson (Crop Science); *Adjunct Professors of Biomathematics:* L. B. Crowder, P. H. Morgan; *Adjunct Associate Professor of Biomathematics:* T. K. Pierson; *Adjunct Assistant Professors of Biomathematics:* P. Dixon, J. S. Kimbell, M. M. Lutz.

Statistics is the body of scientific methodology that deals with the logic of experiment and survey design, the efficient collection and presentation of quantitative information, and the formulation of valid and reliable inferences from sample data. The computer is used as a research tool by the statistician to perform the tasks of management and analysis of data collected from experiments and surveys.

The Department of Statistics is part of the Institute of Statistics, which includes Departments of Biostatistics and Statistics at Chapel Hill. The Department of Statistics provides instruction, consultation, and computational services on research projects for other departments of all colleges at North Carolina State University including the Agricultural Research Service. Department staff are engaged in research in statistical theory and methodology. This range of activities furnishes a professional environment for training students in the use of statistical procedures in the physical, biological and social sciences and in industrial research and development.

OPPORTUNITIES
The importance of sound statistical thinking in the design and analysis of quantitative studies is generally recognized and is reflected in the abundance of job opportunities for statisticians. Industry relies on statistical methods to control the quality of goods in the process of manufacture and to determine the acceptability of goods produced. Statistical procedures based on scientific sampling have become basic tools in such diverse fields as weather forecasting, opinion polling, crop and livestock estimation, and business trend prediction. Because one can improve the efficiency of use of increasingly complex and expensive experiment and survey data, the statistician is in demand wherever quantitative studies are conducted.
SCHOLARSHIPS AND AWARDS

The Department of Statistics recognizes the importance of superior academic performance through the awarding of scholarships and certificates of merit. Scholarships are available for the freshman year and beyond for the purpose of attracting academically superior students. The North Carolina State University Chapter of Mu Sigma Rho, the national statistics honorary fraternity, accepts as members students who have had superior performance in statistics courses. Also, the outstanding senior statistics student is recognized through the awarding of an engraved plaque.

HONORS PROGRAM
The Department of Statistics Honors Program allows exceptional undergraduate students to design a program of study that typically includes advanced courses not ordinarily taken by statistics majors and one or two semesters of independent study or research. Students in the program complete a minimum of 9 credit hours in courses drawn from at least two of the following three categories: MA 425, MA 426 or other courses designated as appropriate by the honors advisor, 500-level courses in statistics or mathematics, and 400- or 500-level courses in independent study. Interested students should contact the Honors Advisor in the statistics department for additional information.

CURRICULA
The undergraduate curriculum provides basic training for a career in statistics or for graduate study and leads to the bachelor of science in statistics. In addition to statistics, the curriculum includes study in mathematics, computer science, and the biological/physical sciences. While fulfilling their major elective requirements, students can either elect a minor or distribute their study across fields exploring the application of statistics in other fields, such as agriculture and life sciences, computer science, economics and business, industrial engineering, and the social sciences. A cooperative work-study option is also available.

The environmental sciences, whether concerned with basic research or monitoring the status of environmental health, are heavily involved in experimental and/or sampling design, collection of data, data analysis and interpretation. Statistics is the science of designing efficient studies for the collection of data to address specific research questions, and the analysis of these data to provide understanding of the nature of the process or population under study. It is important that environmental scientists be aware of the role of statistics in research and be familiar with basic statistical methods in order to properly plan and execute these studies. The Statistics Concentration will prepare students to perform at the junior statistician level so they can become intimately involved

in the research process and in the ideal situation become a full member of the interdisciplinary research team attacking the environmental problem. Successful completion of the Environmental Sciences, Statistics Concentration will also prepare students for graduate study.

CURRICULUM IN STATISTICS
Degree earned: B.S. in Statistics

FRESHMAN YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
E 115 Intro. to Computing Environ.	1	CSC 114 Intro. to Computing-C++	3
ENG 111 Comp. & Rhetoric	3	(or CSC 112)	
MA 141 Calculus I	4	ENG 112 Comp. & Reading	3
Any 100-level PE in Fitness & Wellness	1	MA 241 Calculus II	4
ST 101H Statistics by Example	3	Science Elective[2]	4
History/Literature Elective[1]	3	Physical Education Elective	1
	15		**15**

SOPHOMORE YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
MA 242 Calculus III	4	COM 110 Public Speaking	3
ST 301 Statistical Methods I	3	(or COM 112 or 146 or 211)	
Humanities/Social Science Elective[3]	3	MA 225 Foundations of Adv. Math.	3
Science Elective[2]	4	MA 405 Intro. to Linear Algebra & Matrices	3
	14	ST 302 Statistical Methods II	3
		Humanities/Social Science Elective[3]	3
			15

JUNIOR YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
ST 421 Intro. to Mathematical Stat. I	3	ST 422 Intro. to Mathematical Stat. II	3
ST 430 Intro. to Regression Analysis	3	ST 431 Intro. to Experimenta Design	3
Humanities/Social Science Elective[3]	3	ST 445 Intro. to Stat. Cmptng. & Data Mgmt.	3
Major Elective[4]	3	Major Elective[4]	3
Science Elective[2]	4	Science Elective[2]	3
	16		**15**

SENIOR YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
ENG 331 Comm. for Engr. & Tech.	3	ST 432 Intro. to Survey Sampling	3
(or ENG 332 or 333)		Major Elective[4]	3
ST 435 Stat. Meth. for Qual. & Prod. Improv.	3	Major Elective[4]	3
History/Literature Elective[1]	3	Phil., Relig., Vis/Perf. Arts Elective	3
Major Elective[4]	3	Statistics Elective[5]	3
Sci., Technology, & Soc. Elective	3		**15**
	15		

Minimum Hours Required for Graduation: **120**

Students must have demonstrated foreign language proficiency at the FL_102 level.
[1]At least one of the two History/Literature Electives must focus on a non-English speaking culture.
[2]Two sequences selected from CH 101/102 and (CH 201/202 or 220); PY 205-208; BIO 125 and (BO 200 or 213 or 360/365 or ZO 150 or 212 or 220 or 221); MEA 101 with 110 and (MEA 102 or 130 or 200 or 220). At least one year of CH or PY.
[3]Three courses required coming from at least two of the following lists: Psychology, Economics, Politics and Anthropology, and/or Cultural Geography.
[4]The major elective courses, selected from a list of approved major electives, require the approval of student's advisor.
[5]Statistics elective to be taken from a list of Statistics major elective courses.
[6]Not more than one D grade will be accepted in the required ST, CSC and MA courses, and the major electives (with a grade of C- or better required in ST 421).

CURRICULUM IN ENVIRONMENTAL SCIENCES
STATISTICS CONCENTRATION

FRESHMAN YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
E 115 Intro. to Computing Environ.	1	CFR 134 Computers in Natural Res.	1
ENG 111 Comp. and Rhetoric	3	CSC 112 Intro. to Computing-Fortran	3
MA 141 Calculus I	4	(or CSC 114)	
MEA 101 Geology I:Physical	3	ENG 112 Comp. and Reading	3
MEA 110 Geology I Lab	1	ES 100 Intro. to Environ. Sci.	3
(or MEA 130/135 or MEA 200/210)		MA 241 Calculus II	4
History/Literature Elective[1]	3	Any 100-level PE in Fitness & Wellness	1
	15		**15**

SOPHOMORE YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
CH 101 Chemistry - A Molecular Science	3	ARE 336 Intro. Res. & Environ. Economics	3
CH 102 General Chemistry Lab	1	CH 201 General Chemistry II	3
MA 242 Calculus III	4	CH 202 General Chemistry II Lab	1
ST 301 Statistical Mehtods I	3	MA 225 Foundations of Advanced Math.	3
Economics Elective	3	MA 305 Elementary Linear Algebra *or*	3
Physical Education Elective	1	MA 405 Intro. to Linear Algebra & Matrices	
	15	ST 302 Statistical Methods II	3
			16

JUNIOR YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
BIO 125 General Biology	4	BO 200 Plant Life or ZO 201 Gen. Zoology	4
COM 110 Public Speaking	3	PY 208 Physics for Engr. & Sci. II	4
(or COM 112 or 146 or 211)		ST 431 Intro. to Exp. Design	3
PY 205 Physics for Engr. & Sci. I	4	ST 432 Intro. to Sampling Survey	3
ST 430 Intro. to Regression Analysis	3		**14**
	14		

SENIOR YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
BO 360 Intro. to Ecology	3	ES 400 Environ. Sci. Proj. Course[2]	3
BO 365 Intro. to Ecology Lab	1	ST 422 Intro. to Math. Stat. II	3
ENG 331 Comm. for Engr. & Tech.	3	ST 445 Intro. to Statistical Computing	3
(or ENG 332 or 333)		History/Literature Elective[1]	3
PS 320 United States Environ. Politics or	3	Phil., Relig., Vis/Perf. Arts Elective	3
PS 336 Global Environ. Politics			**15**
ST 421 Intro. to Math. Stat. I	3		
Humanities/Social Science Elective	3		
	16		

Minimum Hours Required for Graduation: **120**

Student must also have demonstrated a foreign language proficiency at the FL_102 level.
[1]At least one of the two History/Literature Electives must focus on a non-English speaking culture.
[2]New course to be implemented.

MINOR IN STATISTICS
The Department of Statistics offers a minor in statistics to majors in any field except statistics. The minor program consists of the successful completion of ST 301-302, ST 371-372 or ST 421-422, and one other approved Department of Statistics course with a grade of C- or better in each course. Other sets of five courses may be acceptable; see the Director of Undergraduate Programs in Statistics.

COLLEGE OF TEXTILES

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R. A. Barnhardt, *Dean*
D. R. Buchanan, *Associate Dean, Extension and Applied Research*
P. L. Grady, *Associate Dean, Special Projects*
C. D. Livengood, *Associate Dean, Academic Programs; Director of Graduate Programs for Fiber and Polymer Science and Textile Technology Management*
P.R. Dail, *Coordinator of Undergraduate Advising*
C. L. Barton, *Assistant to the Dean, Student Services and Placement*
T.M. Langley, *Student Services Manager*
Suzanne Wiener, *Librarian, Burlington Textiles Library*
B. Allen, *Coordinator of Diversity Programs*

The field of textiles is broad. It covers almost every aspect of our daily lives with applications in medicine, space, recreation and sports, personal safety, environmental improvement and control, transportation, household and apparel uses. These versatile materials, textiles, are made to design specifications by a variety of modern high speed processes, utilizing tools such as lasers, electronics and computers. Textiles begins with the synthesis of fibers by man or by nature. Textiles are carried through many processes for fabric formation, including the steps necessary to make fabrics useful, such as the manufacture of dyestuffs and colorants, chemical auxiliaries and finishes, and cutting and fashioning into end-use products.

The approximately 5,000 graduates of the College of Textiles hold diverse positions, many in North Carolina. In the textile and related industries, occupations range from manufacturing management, sales, and corporate management to designing and styling, research and development, technical service, quality control and personnel management. These textile graduates are in the creative and management decision-making aspects of the industry. They plan the flow of materials, processes and information. They create new products and processes. They solve product and process problems. They create styles, designs, patterns, colors, textures, and structures for apparel, home and industrial uses. They engineer systems and products required of industrial, space, medical, apparel and other uses of textile products. They deal with computers, automation, product quality, plant performance and environmental problems. They manage large and small companies, personnel, and systems.

The College of Textiles prepares its graduates for careers in these occupations. A broad background is stressed; two-thirds of the course work normally comes from other departments of the university. Opportunities remain excellent, with the college maintaining one of the university's best placement records. Demand for textile graduates from North Carolina State University is particularly strong, due mainly to the strength of the academic programs. These programs are offered by two degree granting departments: Textile and Apparel Technology and Management, and Textile Engineering, Chemistry, and Science.

DEGREE PROGRAMS

The College of Textiles offers a broad choice of curricula from which to choose. Bachelor of Science programs in Textiles, Textile and Apparel Management, Textile Engineering, and Textile Chemistry are available. These programs allow students to choose from a wide range of courses in addition to required core courses. The Bachelor of Science in Textile Engineering is offered jointly by the College of Textiles and the College of Engineering. The textile student's curriculum includes humanities, social sciences and basic sciences and may include concentrations in business, economics, industrial engineering, mathematics, physics, chemistry, computer science or statistics. A variety of dual degree possibilities are open to textile students, usually requiring two semesters of additional study. Since professional textiles study is concentrated in the last two years of the student's program, it is possible for students from junior or community colleges, or other institutions of higher learning, to transfer to the College of Textiles with a minimum loss of time.

FIELD TRIPS

For certain textile courses, it is desirable for the student to see the manufacturing process under actual operating conditions. When possible, student groups visit outstanding manufacturing plants. Trip participation is required. Transportation costs and other travel expenses, while held to a minimum, are paid by the student.

Upon completion of programs in either textiles, textile and apparel management, textile chemistry, or textile engineering, the degree of Bachelor of Science is conferred.

The College of Textiles offers the following graduate degrees: Master of Textiles, Master of Science in Textiles, Master of Science in Textile Chemistry, Master in Science in Textile Engineering, Doctor of Philosophy in Fiber and Polymer Science, and Doctor of Philosophy in Textile Technology and Management. For general requirements, consult the Graduate Catalog. By faculty agreement, candidates for the Doctor of Philosophy degree in other schools of this university may specialize in textile-related subjects. In such cases, research is usually done in textiles.

DOUBLE/DUAL DEGREE PROGRAMS

ELI WHITNEY DOUBLE DEGREE PROGRAM IN TEXTILE AND APPAREL MANAGEMENT AND INTERNATIONAL STUDIES

The joint program between the College of Textiles and the College of Humanities and Social Sciences allows a student to earn a B.S. degree in Textile and Apparel Management and a B.A. degree in Multidisciplinary Studies with a concentration in International Studies. This dual degree is designed to prepare students for work in the increasingly international textile industry.

The program includes all the technical course requirements associated with the Textile and Apparel Management degree. For the B.A. in Multidisciplinary Studies, students choose from among three areas of concentration: the Pacific Rim (language study in Japanese or Chinese), Latin America (language study in Spanish), or Europe (language study in German or Italian). The program, which takes five years to complete, includes possible overseas internships.

Merit scholarship awards are available for high-achieving students who participate in the double degree program. For more information, contact the Department of Textile and Apparel Technology and Management, Centennial Campus, Rm. 3245 Textile Complex or the Assistant Dean of Undergraduate Studies, College of Humanities and Social Sciences, 106 Caldwell Hall.

FACILITIES
The new College of Textiles Building became a reality in the spring of 1991. The Centennial Campus, which contains the new facility as well as other research and educational facilities, has grown to approximately 1,000 acres.
The North Carolina General Assembly allocated $27 million to build the College of Textiles facility and an additional $6 million for equipment modernization. The 298,000 square foot facility was planned by the faculty and staff at the college, in conjunction with a review process for recommendation and improvements from key industry representatives. Space allocation for undergraduate programs is 34 percent, and for graduate and research programs, 31 percent.

The college developed a Model Manufacturing Facility within the new building that is capable of extruding fiber; spinning, weaving/knitting and finishing fabric; producing nonwovens; and constructing garments. This facility is the only one of its kind in the world dedicated to textile industry/academic sponsorship.

The College of Textiles on the Centennial Campus is the center for textile education and research in the U.S. Within its walls are a critical mass of students, faculty, facilities, and programs that will "make a difference" for United States fiber, textile, and apparel industries.

COOPERATIVE EDUCATION PROGRAM
This is a voluntary program which combines academic study with job experience. To be eligible for the program, a student must have completed two semesters at NC State (one semester for transfer students) and have a minimum GPA of 2.250. The program provides for alternating semesters of full-time study and full-time work. A minimum of three work periods is required to complete the program.

HONORS AND SCHOLARS PROGRAMS
This program offers exceptional students the opportunity to explore areas of special interest through various forms of research or independent study. Students of high academic level, after their first or second year of study, are invited to participate in this program. Special lectures, discussion groups and seminars in the freshman and sophomore years offer possibilities for future development in the honors program. Additional advising is available and recommended in order to create and define degree programs which meet students' needs. Honors sections and graduate level classes are open to these students. The College of Textiles honor student will conduct a literature review and conduct an honors research project in an area of special interest. The honors project ranges from a scholarly review of a special topic to a discussion of an experimental research problem.

HONOR SOCIETY
Sigma Tau Sigma is the scholastic textile fraternity which was founded in the College of Textiles in 1929 to honor students who have a grade point average of 3.250 or higher. The main goal of this fraternity is to create a high standard of scholarship among textile students. Twice every year the local chapter selects as its prospective members junior textile students who meet the above criterion. Sigma Tau Sigma also promotes excellence by awarding a trophy to the graduating senior with the highest overall grade point average in the college.

TEXTILE SCHOLARS-IN-RESIDENCE PROGRAM
This program is sponsored by the College of Textiles and the Division of Student Affairs. It is a four-year program with emphasis on a textile seminar series and educational and cultural enrichment activities. These co-curricular activities include seminars on special topics related to the textile curriculum and profession, tutorial sessions, field trips and musical and drama performances. Students are invited to join this program after their acceptance at NC State based on their predicted performance and must maintain a GPA of 3.000 to continue. All students are housed together with upperclassmen living with freshmen whenever possible.

SCHOLARSHIPS
The Directors of the North Carolina Textile Foundation and friends of the College of Textiles have established an outstanding freshman scholarship program for textile majors: Textile Foundation Merit Awards--These scholarships are renewable for up to four years of study at $5,000 per year, constituting an overall award of $20,000. A tuition differential may be added to the award for an out-of-state student. Ten new recipients are chosen every year.

Textile Freshman Prestige Scholarships--Up to twenty of these scholarships will be awarded to members of each class. Ranging from $1,000 to $2,000 per year, these scholarships are renewable for up to four years.

SUMMER EMPLOYMENT
Job opportunities for summer employment are available for textile students. Placement assistance is available through the college placement office and frequently can be arranged in the student's home community. Qualified students may arrange to receive academic credit through the Industrial Intern program.

FOUR-ONE PROGRAM
The College of Textiles has a program which permits a student with a baccalaureate degree from an accredited college or university to complete the requirements for a Bachelor of Science degree in textiles, textile and apparel management, or textile chemistry after the satisfactory completion of a minimum of one year of study.

Applicants should have completed basic economics, mathematics, physics and chemistry requirements comparable with those required for the textile degree sought. Under these conditions, the student generally may complete the degree requirements in two summer sessions and two regular semesters. Students not meeting specific requirements in business, economics, sciences, or mathematics should remove deficiencies prior to entering a specific degree program, otherwise the program of study may require three or more semesters.

Each applicant's undergraduate program is considered individually and, in general, a complete transfer of credits is possible.

ASSOCIATE OF THE TEXTILE INSTITUTE (ATI) DIPLOMA
The Textile Institute with headquarters in Manchester, England is a prestigious international professional textile organization. This organization recognizes graduates from most of the College of Textiles programs who have achieved a GPA of 2.800 or higher. These graduates will be granted full exemption from the ATI examination.

SCOTTISH COLLEGE OF TEXTILES EXCHANGE PROGRAM
Selected students enrolled in the textile design option with junior standing are given the opportunity to spend the spring semester of the junior year at the

Scottish College of Textiles while registered for textile design courses at NC State. Tuition and fees are paid at the regular rate to NC State. Travel costs for the selected students will be funded through the Louis Cramer Award in textile design which is administered by the College of Textiles. Each student will be responsible for costs of accommodations, meals and other personal needs.

Similar arrangements are available for students of the Scottish College of Textiles. The total exchange program is limited to 12 credit hours.

ECOLE SUPERIEURE DES TECHNIQUES INDUSTRIELLES ET DES TEXTILES (ESTIT), LILLE, FRANCE, EXCHANGE PROGRAM

Selected students enrolled in the textile engineering and textile chemistry degree programs are given the opportunity to spend a semester or a year at ESTIT while registered at NC State. Tuition and fees are paid at the regular rate to NC State. Each student is responsible for cost of accommodations, meals and other personal needs.
Similar arrangements are available for students of ESTIT.

SPECIAL SERVICES

The College of Textiles offers several services and programs which enrich its academic programs.
Textile and Apparel Research is conducted on a wide variety of problems relating to the fiber, textile and apparel industries. Frequently, the problems are interdisciplinary and involve team effort. Students have an opportunity to participate in the solution to current problems.
Textiles Extension and Continuing Education is vigorously participated in by faculty. It serves the needs of the textile industry by disseminating research findings and offering short courses for executive, scientific and supervisory personnel. The two-way exchange in these activities keeps students and faculty informed on all of the latest developments.
The Office of Student Services is responsible for the placement and financial aid programs of the College of Textiles. The placement office brings together industry recruiters and students for interview sessions for permanent and summer employment. Alumni may also take advantage of the placement office.
The financial aid function is operated by a committee. It is possible for any North Carolina student to pursue an education in textiles through scholarships, loans or grants, as long as he or she maintains the university's academic standards.

TEXTILE OFF-CAMPUS TELEVISED EDUCATION (TOTE)

TOTE is a special videocassette-based program designed to give any qualified person an opportunity to participate in College of Textiles courses previously only available to on-campus students. Recordings are made in a specially designed studio/classroom at the College of Textiles. Regularly scheduled classes are recorded in such a manner as to retain the normal classroom atmosphere. Lectures are presented in total, candidly and informally.

Certificate Programs as well as single courses are available to any individual seeking an improved textiles education or background. TOTE students off-campus are on a schedule approximately one week behind the university semester calendar. To offer the distance learner maximum course choices, certain pre-recorded courses whose content is current are available. In these cases, the distance learner has the same contact opportunities with the classroom lecturer.

DEPARTMENT OF TEXTILE AND APPAREL TECHNOLOGY AND MANAGEMENT

College of Textiles, Centennial Campus, Room 3245
Phone: (919) 515-6646

T. J. Little, *Head*
W. Oxenham, *Associate Head and Director of Graduate Programs*

Klopman Distinguished Professor: S. C. Winchester Jr.,; *Alumni Distinguished Undergraduate Professors:* P. Banks-Lee, M. L. Robinson; *Professors:* R. A. Barnhardt, S. K. Batra, R. A. Donaldson, T. J. Little, W. Oxenham, M. W. Suh; *Visiting Professor:* E. M. McPherson; *Adjunct Professors:* R. W. Dent, M. Gaetan, A. B. Godfrey, W. A. Klopman, J. Jackson-Ledermann; *Professors Emeriti:* G. A. Berkstresser III, A. H. El-Shiekh, W. C. Stuckey Jr.; *Associate Professors Emeriti:* P. B. Hudson, M. L. Robinson; *Associate Professors:* P. Banks-Lee, H. A. Davis, T. K. Ghosh, H. H. A. Hergeth, G. L. Hodge,T. Lassiter, A. Seyam, G. W. Smith; *Adjunct Associate Professors:* W. Barrie Fraser, W. Harazin, A. Hunter, W. Kudh, C. Priestland, P. E. Sasser; *Visiting Assistant Professor:* E.C. Carrere; *Assistant Professor Emeritus:* F. W. Massey; *Adjunct Instructor:*E. Barber, M. Stowe; *Lecturer:* B.F. Allen.

The Department of Textile and Apparel, Technology and Management offers bachelor of science degrees in Textile and Apparel Management and in Textile Technology. Each degree permits the student to specialize in concentrations. The curricula combine a foundation both in textile management and textile technology principles and applications. The B.S. Textile and Apparel Management degree has a Management concentration and an Apparel concentration, while the B.S. Textile Technology degree offers a Textile Design Option.

CURRICULA

The B.S. in Textile and Apparel Management, together with its concentrations, provides opportunities for the student to get additional background in apparel manufacturing, production factors, law and labor relations, management science, finance and accounting.

The B.S. in Textile Technology offers the student a background in the technology of manufacturing, design, development and evaluation of textile products. The textile technology program is both flexible and diverse, requiring students to acquire an understanding of all aspects of textile manufacturing processes and products. The program involves many academic disciplines and offers a well-rounded versatile degree, which prepares students to a wide range of careers. Popular minors include Design, Foreign Language, Industrial Engineering, Business and Economics.
The Textile and Apparel Management department also administrates the Eli Whitney Scholarship program for students wishing to undertake a study of international business in conjunction with their studies in Textile and Apparel Management. This program permits the student to earn a B.A. degree as offered by the College of Humanities and Social Science and a B.S. degree in Textile and Apparel Management.

CURRICULUM IN TEXTILE TECHNOLOGY*
Degree earned: B.S. in Textile and Apparel Management

FRESHMAN YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
CH 101 Chemistry - A Molecular Science	3	ENG 112 Comp. & Reading	3
CH 102 General Chemistry Lab	1	MA 231 Analytic Geom. & Calculus B and	
ENG 111 Comp. & Rhetoric	3	MA 132 Computers in Calculus	
MA 131 Calc. For Life & Mgmt. Sci.		or MA 241 Analytic Geom. & Calculus II	4
or MA 141 Analytic Geom. & Calculus I	3/4	PY 211 College Physics I	
TT 105 Intro. to Textile Technology	4	or PY 205 Physics for English and Science	4
PE 100 Fitness & Wellness	1	TMS 211 Intro. to Fiber Science	3
	14/15	PE Elective	1
			15

SOPHOMORE YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
EC 205 Intro to Economics	3	TT 241 Knitted Fabric Technology – I	3
PY 212 College Physics II		TT 251 Woven Fabric Technology – I	3
or PY 208 Physics For Eng. & Scientists	4	TC 203 Introduction to Polymer Chemistry	3
TT 221 Yarn Production and Properties – I	3	ST 361 Intro. to Statistics for Engr.	3
TAM 218 Intro to Apparel Technology Mgmt.	3	Humanities/Social Science Elective	3
CSC 114 Intro to Computing			**17**
or CSC 200 Intro to Computers & Their Use	3		
	16		

JUNIOR YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
TC 302 Technology of Dyeing & Finishing	4	TT Core Elective[1]	3
TT Core Elective[1]	3	TT Core Elective[1]	3
ENG 331 Comm for Engr. & Technology		TT 431 Quality Mgmt and Ctrl in Tex Mfg	3
or ENG 332 Comm for Bus & Mgmt.		Textile Option Elective[2]	3
or ENG 333 Comm for Science & Res	3	Humanities/Soc.Sci. Electives[2]	3
TT 331 Evaluation of Textile Materials	4		
Humanities/Soc.Sci. Elective[2]	3		
	17		**15**

SENIOR YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
TT 497 Tech. of Prod.-Proc. Dev. In Tex. I	3	TT 498 Tech. of Prod.-Proc. Dev. In Tex. II	3
TT Option Elective[2]	3	TT Option Elective[2]	3
TAM 380 Mgmt. & Contl. Text. Appl. Syst.	3	TAM 481 Production Cost Text & App.	3
Humanities/Social Science Elective	3	Humanities/Soc.Sci. Elective[2]	3
Humanities/Social Science Elective	3		**12**
	15		

Minimum Hours Required for Graduation: 120

Notes:

[1] Textile Technology Core Electives: (9 cr) A minimum of 3 of the following: TT 305, TT 321, TT 341, TT 351

[2] Textile Technology Option Electives: (9 cr) A minimum of 3 courses form one of the following options. These courses can also be used for minors or double degrees with careful advanced planning by the student. Elect a total of nine credit hours from one of the following groups*:

Apparel Technology: TAM 315, TAM 316, TAM 415, TAM 416
Manufacturing Technology: TT 421, TT 425, TT 443, TT451, TAM 485, TAM 486, IE 352, IE 452
Management Science: ACC 280, TAM 480, TAM 485, TAM 486, IE 311
Polymer Science: CH 201, TC 402, TMS 460, MAT 225
Textile Design: TAM 371**, TAM 372**, TAM 485, TT 451

The following options are recommended to students interested in pursuing graduate education in textiles or other related areas. The student may choose nine credit hours from any one of the following groups. In addition, they are required to take MA 141 and 241 instead of MA 131, 132, and 231.

Mathematics: MA 242, 305, and 341
Statistics: ST 301, 302, and 431
Industrial Engineering: IE 311, 352, and 452

* TAM 490 or TAM 491 will be considered as an elective in any one of these groups with prior approval of the academic advisor.

** Required courses

NOTE: TAM 471 and TAM 472 may substitute for TT 497 and TT 498, respectively, with prior approval of the academic advisor.

CURRICULUM IN TEXTILE AND APPAREL MANAGEMENT
APPAREL MANAGEMENT CONCENTRATION
Degree earned: B.S. in Textile and Apparel Management

FRESHMAN YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
CH 101 Chemistry - A Molecular Science	3	EC 201 Prin. of Microeconomics[3]	3
CH 102 General Chemistry Lab	1	ENG 112 Comp. & Reading	3
ENG 111 Composition & Rhetoric	3	MA 231 Calculus for Life & Mgmt. Sciences	3
MA 131 Calculus for Life & Mgmt. Sciences	3	and MA 132 Comp. Math for Life & Mgmt.	1
T 105 Intro. to Text. Materials Sciencd	4	TAM 218 Intro. to Apparel Technology Mgmt	3
PE Fitness & Wellness	1	TMS 211 Intro to Fiber Science	3
		PE	1
	15		**16**

SOPHOMORE YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
ACC 280 Managerial Accounting[3]	3	BUS/ST 350 Economics. & Bus. Statistics	
EC 202 Prin. of Macroeconomics	3	or ST 361 Intro. to Statistics for Engr.	3
PY 205 Physics for Engr. & Sci.[1, 2]		TT 241 Knitted Fabric Technology II	3
or PY 211 College Physics I	4	TT 251 Woven Fabric Technology I	3
TT 221 Yarn Production & Properties I	3	Humanities/Soc.Sci. Elective[4]	3
Humanities/Social Science Elective[4]	3	Humanities/Soc.Sci. Elective[4]	3
			15
	16		

JUNIOR YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
ENG 331 Comm. for Engr. & Technology or		BUS 320 Financial Management	3
ENG 332 Comm. for Business & Mgmt. or		TAM 316 Apparel Production II	3
ENG 333 Comm. for Sci. & Research	3	TAM 481 Production Cost Text. & Apparel	3
TAM 315 Apparel Production I	3	TC 302 Wet Processing	4
TAM 380 Mgmt. & Control. Text. Applic. Sys.[3]	3	Humanities/Soc.Sci. Elective[4]	3
TAM 382 Princ. of Soft Goods Mktg.	3		**16**
TT 331 Princ. of Textile Meas. & Eval.	3		
	16		

SENIOR YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
TAM 415 Apparel Product Dev.	3	TAM 416 Apparel Production III	3
TAM 480 Prod. Mgmt. Dec. for Text. Oper.	3	TAM 497 Senior Project	4
Management Core Elective[5]	3	Apparel Management Elective[6]	3
Management Core Elective[5]	3	Humanities/Soc.Sci. Elective[4]	3
Apparel Management Elective[6]	3		**13**
	15		

Minimum Hours Required for Graduation: 123

Foreign language proficiency at the FL_ 102 level is required for graduation, either by taking FL_ 102 or by placement out of FL_ 102.
It is strongly suggested to all students to take Free Electives as permitted by their schedule.
[1]A Physics sequence (e.g. PY 205/PY 208 or PY 211/PY 212) is strongly suggested for students who see themselves working in research related areas.
[2]Prerequisite for PY 205 is MA 141 with grade C or better.
[3]A minimum grade of C is required in EC 201, ACC 280, and TAM 380 for graduation in this concentration. Credit is not allowed for both ACC 280 and the ACC 210/ACC 220 series.
[4]Within the Humanities/Social Science electives that have not been specified the following criteria must be met:
-Two courses (6 CR) must be from the "History Electives" or "Literature Electives" lists--or one of each
-One course (3 CR) must be from any of the lists "Philosophy Electives," "Religion Electives," "Visual and Performing Arts Electives."
-One course (3 CR) must be from any of the lists "Psychology Electives," "Politics and Government Electives," "Sociology Electives," "Anthropology Electives," "Cultural Geography Electives."
-One of these course must be from the lists of "Courses on Non-English Speaking Cultures."
-One course (3 cr.) must be from the list "Science, Technology, and Society (Humanities and Social Science Perspective)."
[5]Textile Electives:
[5]A minimum of 6 credit hours of Management Core Electives is required towards the degree. Students will select (2) two courses from the following list: TAM 431, TAM 482, or TAM 484.
[6]A minimum of 6 credit hours of Apparel Management Electives is required towards the degree. Students will select (2) two courses from the following list: TAM 483, TAM 485, TAM 486, TAM 487, IE 452. TAM 490 or TAM 491 will also be considered as an elective with prior approval of the academic advisor.
*Students in the Apparel Management concentration must take TAM 431 and TAM 487 as Textile Electives.
**Credit towards the Textile Electives will only be given for either TAM 490 or T 493.

CURRICULUM IN TEXTILE AND APPAREL MANAGEMENT
TEXTILE MANAGEMENT CONCENTRATION
Degree earned: B.S. in Textile and Apparel Management

FRESHMAN YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
CH 101 Chemistry - A Molecular Science	3	EC 201 Prin. of Microeconomics[3]	3
CH 102 General Chemistry Lab	1	ENG 112 Comp. & Reading	3
ENG 111 Comp. & Rhetoric	3	MA 231 Analytic Geom. & Calculus B *and*	3
MA 131 Analytic Geom. & Calculus A	3	MA 132 Computers in Calculus *or*	1
T 105 Intro. to Text. Materials Sci.	3	TAM 218 Intro. to Apparel Technology Mgmt.	3
Any 100-level PE in Fitness & Wellness	1	TMS 211 Intro to Fiber Science	3
	14	Physical Education Elective	**1**
			17

SOPHOMORE YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
ACC 280 Managerial Accounting[3]	3	BUS/ST 350 Economics. & Bus. Statistics *or*	
EC 202 Prin. of Macroeconomics	3	ST 361 Intro. to Statistics for Engr.	3
PY 205 Physics for Engr. & Sci.[1] *or*		BUS 320 Financial Mgmt	3
PY 211 College Physics I	4	TT 241 Knitted Fabric Technology	3
TT 221 Yarn Production & Properties I	3	TT 251 Woven Fabric Technology	3
	13	Humanities/Soc.Sci. Elective[4]	3
			15

JUNIOR YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
TAM 382 Princ. of Soft Goods Mktg.	3	TAM 480 Prod. Mgmt. Dec. Text. Oper.	3
TT 331 Prin. of Text. Meas. & Eval.	3	TAM 481 Prod. Cost Text. & Applic.	3
TC 302 Wet Process Tech of Dyeing	3	Textile Elective[5]	3
ENG 331 Comm. for Engr. & Technology or		Textile Elective[5]	3
ENG 332 Comm. for Business & Mgmt. or		Mgmt. Elective[7]	3
ENG 333 Comm. for Sci. & Research	3		**15**
TAM 380 Mgmt. & Control. Text. Applic. Sys.[3]	3		
	17		

SENIOR YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
Humanities/Soc.Sci. Elective[4]	3	TAM 497 Senior Project	4
Humanities/Soc.Sci. Elective[4]	3	Humanities/Soc.Sci. Elective[4]	3
Mgmt. Core Elective[6]	3	Mgmt.Core Elective[6]	3
Textile Elective[5]	3	Management Elective[7]	3
Management Elective[7]	3		**13**
	15		

Minimum Hours Required for Graduation: 123

Foreign language proficiency at the FL_ 102 level is required for graduation, either by taking FL_ 102 or by placement out of FL_ 102.
It is strongly suggested to all students to take Free Electives as permitted by their schedule.
[1]A Physics sequence (e.g. PY 205/PY 208 or PY 211/PY 212) is strongly suggested for students who see themselves working in research related areas.
[2]Prerequisite for PY 205 is MA 141 with grade C or better.
[3]A minimum grade of C is required in EC 201, ACC 280, and TAM 380 for graduation in this concentration.
[4]Within the Humanities/Social Sci electives that have not been specified the following criteria must be met:
-Two courses (6 CR) must be from the "History Electives" or "Literature Electives" lists.
-One course (3 CR) must be from any of the lists "Philosophy Electives," "Religion Electives," "Visual and Performing Arts Electives."
-One course (3 CR) must be from any of the lists "Psychology Electives," "Politics and Government Electives," "Sociology Electives," "Anthropology Electives," "Cultural Geography Electives."
-One of these course must be from the lists of "Courses on Non-English Speaking Cultures."
-One course (3 CR) must be from the list "Science, Technology, and Society (Humanities and Social Science Perspective)."
[5]Textile Technology Electives:
A minimum of 9 credit hours of Textile Electives is required towards the degree. Students will select three courses from the following list: TT 305, TT 321, TT 341, TT 351, TT 370, TT 421, TT 425, TT 443, TT 451.
[6]Textile Management Core Electives:
A minimum of two courses is required from the following list of courses: TAM 431, TAM 482, TAM 484
[7]Textile Management Electives:
A minimum of three courses from one of the following options is required for the Textile Management concentration. These courses can also count towards Minors (e.g. Business Management, Industrial Engineering, Statistics) or a double degree program in International Studies (the Eli Whitney Scholars Program). Minors and double degrees will require additional courses, so that such programs have to be prepared by the individual student with care. TAM 490 or TAM 491 will also be considered as an elective with prior approval of the academic adviser.

Planning and Logistics:
TAM 485, TAM 486, IE 311, PSY 340, TAM 401, BUS 340

International Operations
TAM 483, TAM 494, BUS 346, BUS 449, BUS 464, EC 375, EC 448, PS 431, FLC 201, FLC 202, FLF 201, FLF 202, FLG 201, FLG 202, FLI 201, FLI 202, FLJ 201, FLJ 202, FLS 201, FLS 202

Labor and Law
TAM 381, TAM 487, BUS 305 or BUS 307, BUS 407, BUS 330, BUS 432, BUS 434, TAM 401, PSY 307, PSY 340, PHI 314

Recommended to students interested in pursuing graduate education in textiles or other related areas. For the following options, MA 141, 241 are required instead of MA 131, 132, and 231.
Mathematics: MA 242, 305, and 241
Statistics: ST 301, 302, and 431
Industrial Engineering: IE 311, 352, and 452

DEPARTMENT OF TEXILE ENGINEERING, CHEMISTRY, AND SCIENCE

www.tx.ncsu.edu/tecs

College of Textiles, Centennial Campus, Room 3250
Phone: (919) 515-6558

K. R. Beck, *Head*
T. G. Clapp, *Associate Head, Director of Undergraduate Programs*
H. S. Freeman, *Associate Head, Director of Graduate Programs*

Alumni Distinguished Undergraduate Professor: C.D. Livengood, *Ciba-Geigy Professor:* H.S. Freeman; *Professors:* R.L. Barker, K.R. Beck, D.R. Buchanan, T.G. Clapp H. S. Freeman, P.L. Grady, B.S. Gupta, H. Hamoulda, S.M. Hudson, C.D. Livengood, G. N. Mock, M. H. Mohamed, C. B. Smith, M. H. Theil, A.E. Tonelli; *Adjunct Professors:* A. Bogdanovich, R. Goldman, J. B. Levy, K. Umbach; *Professors Emeriti:* J. F. Bogdan, K. S. Campbell, D. M. Cates, J. A. Cuculo, P. D. Emerson, R. D. Gilbert, D. S. Hamby, S. P. Hersh, P. R. Lord, R. McGregor, M.H. Mohamed, H.A. Rutherford, P.A. Tucker, W. K. Walsh, W. M. Whaley; *Associate Professors:* P.J. Hauser, W.J. Jasper, J. W. Rucker, J. P. Rust; *Adjunct Associate Professors:* W. P. Behnke, L. D. Claxton, W. Hunter, T. Montgomery; *EM.Associate Professors Emeriti:* T. H. Guion, A. C. Hayes, T. G. Rochow; *Assistant Professors:* D. Hinks, M.G. McCord, Yiping Qio; *Adjunct Assistant Professors:* A. C. Bullerwell, S. Salmon, M.S. Slocum, Y. Wang; *Associate Members of the Faculty:* S. K. Batra (Textile and Apparel Management), R. E. Fornes (Physics).

The Department of Textile Engineering, Chemistry, and Science offers bachelor of science degrees embracing a number of disciplines. Students receive a fundamental knowledge of the science and engineering involved in the production of polymers, fibers, yams and fabrics, and products based on them, and the process of dyeing and finishing.

CURRICULA

The B.S. in Textile Chemistry is heavily oriented to the chemistry of polymers, their formation, and the preparation of textile materials for the consumer including scouring, bleaching, printing, dyeing and finishing. The degree program offers five different concentrations: Dyeing and Finishing Management, Dyeing and Finishing Operations, Dyeing and Finishing Science, Polymer Chemistry and, General Studies.

The first two concentrations are primarily for students who wish to pursue a bachelor of science degree, whereas the other three concentrations are oriented toward students wanting advanced studies. However, the student taking dyeing and finishing operations or dyeing and finishing management can use elective courses to achieve a background suitable for graduate studies. The General Studies concentration qualifies students for ACS (American Chemical Society) certification.

The B.S. in Textile Engineering provides a broad base of fundamental engineering courses as a foundation for studies in textile engineering. The textile engineering courses deal with the application of scientific and engineering principles to the design and control of all aspects of fiber, textile and apparel processes, products and machinery. These include natural and man-made materials, interaction of materials with machines, safety and health, energy conservation, and waste and pollution control. The B.S. in Textile Engineering is offered jointly with the College of Engineering. For more details about the program, see description under the College of Engineering.

CURRICULUM IN TEXTILE CHEMISTRY
DYEING AND FINISHING MANAGEMENT CONCENTRATION
Degree earned: B.S. in Textile Chemistry

FRESHMAN YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
CH 101 Chemistry - A Molecular Science	3	CH 201 Chemistry - A Quantitative Science	3
CH 102 General Chemistry Lab	1	CH 202 Quantitative Chemistry Lab	1
ENG 111 Comp. & Rhetoric	3	ENG 112 Comp. & Reading	3
**MA 131 Calc. for Life & Mgmt. Sci. A[3] or	3	MA 231 Calc. for Life & Mgmt. Sci. B and	3
MA 141 Calculus I	4	**MA 132 Cmp Math. forLife&Mgmt.Sci.[3]or	1
TC 105 Intro.to Text. & Computers	3	MA 241 Calculus II	4
Any 100-level PE in Fitness & Wellness	1	TC 203 Intro. to Polymer Chemistry	3
	14/15	Physical Education Elective	1
			15

SOPHOMORE YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
CH 221 Organic Chemistry I	4	CH 223 Organic Chemistry II	4
PY 205 Physics for Engr. & Sci. I or		PY 208 Physics for Engr. & Sci. II or	
PY 211 College Physics I	4	PY 212 College Physics II	4
TMS 211 Intro. to Fiber Sci.	3	TC 301 Technology of Dyeing & Finishing	4
EC 205 Fund. of Economics	3	PSY 200 Intro. to Psychology	3
	14		**15**

JUNIOR YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
ST 361 Intro. Stat. for Engr.	3	TC 305 Intro. to Color Sci. & Applic	3
TC 310 Text. Preparation & Finishing Chem.	3	TC 320 Text. Dyeing & Printing	3
Physical Chemistry Elective	3	TC 412 Text. Chemical Analysis	3
TC 461 Intro. to Fiber-Forming Polymers	4	Physical Chemistry Elective	3
TMS 210 Yarn & Fabric Form. & Properties	4	ENG 331 Comm. for Engr. & Technology or	
	17	ENG 333 Comm. for Sci. & Research	**3**
			15

SENIOR YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
ACC 280 Managerial Accounting	3	TAM 480 Text. Prod. & Cost Control	3
TAM 380 Mgmt. & Control. Text. Applic. Sys.	3	TC 401 Environ. Sci. Textiles	3
Humanities/Soc.Sci. Electives[1]	6	TC 407 Wet Proc. Opern. & QC	3
PSY 307 Indust. & Organizational Psy.	3	Humanities/Soc.Sci. Electives[1]	6
	15		**15**

Minimum Hours Required for Graduation: 120/121

** If you took MA 131 before the Fall of 1997 as a 4 credit course, you ARE NOT required to take MA 132.
[1]Humanities and Social Science and Other Requirements (21 hours minimum). All courses must be completed with regular grading.
a. Select two courses from the list of history courses or two courses from the list of literature courses. The literature courses should be selected from the same language.
b. Select one course from the list of philosophy, religion, or visual/performing arts courses.
c. To satisfy the program requirements, EC 201, PSY 200 and PSY 307 must be taken.
d. Select one course from the list of science, technology and society courses (humanities and social science perspective).
e. At least one of the above unspecified courses must focus on a non-English speaking culture.
f. Competency in a foreign language at the 102 level is required for graduation.
[2]Any TC course including T 493 and T 497. (NOTE: GPA and/or prerequisite restrictions may apply. Consult the catalog and the instructor.)
[3]MA 132 required if MA 131 is taken.

CURRICULUM IN TEXTILE CHEMISTRY
DYEING AND FINISHING OPERATIONS CONCENTRATION
Degree earned: B.S. in Textile Chemistry

FRESHMAN YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
CH 101 Chemistry - A Molecular Science	3	CH 201 Chemistry - A Quantitative Science	3
CH 102 General Chemistry Lab	1	CH 202 Quantitative Chemistry Lab	1
ENG 111 Comp. & Rhetoric	3	ENG 112 Comp. & Reading	3
**MA 131Calculus for Life Mgmt. Sci. A[5] or	3	MA 231 Calc. for Life & Mgmt. Sci. B and	3
MA 141 Calculus I	4	**MA 132 Comp Math for Life&Mgmt Sci[5]or	1
TC 105 Intro. to Text. & Computers	3	MA 241 Calculus II	4
Any 100-level PE in Fitness & Wellness	1	TC 203 Intro. to Polymer Chemistry	3
	14/15	Physical Education Elective	1
			15

SOPHOMORE YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
CH 221 Organic Chemistry I	4	CH 223 Organic Chemistry II	4
PY 205 Physics for Engr. & Sci. I or		PY 208 Physics for Engr. & Sci. II or	
PY 211 College Physics I	4	PY 212 College Physics II	4
TMS 211 Intro. to Fiber Sci.	3	TC 301 Technology of Dyeing & Finishing	4
Humanities/Soc.Sci. Elective[1]	3	Humanities/Soc.Sci. Elective[1]	3
	14		**15**

JUNIOR YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
TC 310 Text. Preparation & Finishing Chem.	3	ENG 331 Comm. for Engr. & Technology or	
Physical Chemistry Elective	3	ENG 333 Comm. for Sci. & Research	3
TC 461 Intro. to Fiber-Forming Polymers	4	TC 305 Intro. to Color Sci. & Its Applic.	3
TMS 210 Yarn & Fabric Form. & Polymers	4	TC 320 Text. Dyeing & Printing	3
ST 361 Intro. to Statistics for Engineering	3	TC 412 Text. Chemical Analysis	3
	17	Physical Chemistry Elective	3
			15

SENIOR YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
Humanities/Soc.Sci. Electives[1]	9	TC 401 Environ. Sci. Text.	3
Textile Elective[2]	3	TC 407 Wet Proc. Opern. & QC	3
Textile Chemistry Elective[3]	3	Humanities/Soc.Sci. Electives[1]	6
	15	Textile Elective**	1
			15

Minimum Hours Required for Graduation: 120

[1]Humanities and Social Science and Other Requirements (21 hours minimum). All courses must be completed with regular grading.
a Select two courses from the list of history courses or two courses from the list of literature courses. The literature courses should be selected from the same language.
b. Select one course from the list of philosophy, religion, or visual/performing arts courses.
c. Select two courses from any one of the following social science areas: anthropology, cultural geography, economics, politics and government, psychology, sociology.
d. Select one course from the list of science, technology and society courses (humanities and social science perspective).
e. Select one course from any of the disciplines of humanities and social sciences.
f. At least one of the above seven (7) courses must focus on a non-English speaking culture.
g. Competency in a foreign language at the 102 level is required for graduation.
[2]Restricted Elective (3 hours). Choose from the following: ACC 280, any chemistry or mathematics course at 200 or above level.
[3]Textile Chemistry Elective (3 hours). Any TC course.
[4]Textile Elective (3 hours). Any T, TAM, TES, TMS or TT course.
[5]MA 132 required if MA 131 is taken.

CURRICULUM IN TEXTILE CHEMISTRY
DYEING AND FINISHING SCIENCE CONCENTRATION
Degree earned: B.S. in Textile Chemistry

FRESHMAN YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
CH 101 Chemistry - A Molecular Science	3	CH 201 Chemistry - A Quantitative Science	3
CH 102 General Chemistry Lab	1	CH 202 Quantitative Chemistry Lab	1
ENG 111 Comp. & Rhetoric	3	ENG 112 Comp. & Reading	3
MA 141 Calculus I	4	MA 241 Calculus II	4
Any 100-level PE in Fitness & Wellness	1	TC 203 Intro. to Polymer Chemistry	3
TC 105 Intro. to Text & Computers	3	Physical Education Elective	1
	15		**15**

SOPHOMORE YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
CH 221 Organic Chemistry I	4	CH 223 Organic Chemistry II	4
MA 242 Calculus III	4	MA 341 Appl. Diff. Equations I	3
PY 205 Physics for Engr. & Sci. I	4	PY 208 Physics for Engr. & Sci. II	4
TMS 211 Intro. to Fiber Sci.	3	TC 301 Technology of Dyeing & Finishing	4
	15		**15**

JUNIOR YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
TC 310 Text. Preparation & Finishing Chem.	3	ENG 331 Comm. for Engr. & Technology or	
TMS 210 Yarn & Fabric Form & Prop.	4	ENG 333 Comm. for Sci. & Research	3
Humanities/Soc.Sci. Elective	3	TC 305 Intro. to Color Sci. & Its Applic.	3
Phys. Chemical/Thermdyn. Elective[2]	3	TC 320 Text. Dyeing & Printing	3
ST 370 Prob. & Statistics for Engineers	3	TC 412 Text. Chemical Analysis	3
	16	Phys. Chemical/Thermdyn Elective[2]	3
			15

SENIOR YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
TC 461 Intro. to Fiber-Forming Polymers	4	TC 401 Environ. Sci. Text.	3
Dyeing and Finishing Elective	3	TC 407 Wet Proc. Opern. & QC	3
Humanities/Soc.Sci. Electives[1]	9	Humanities/Soc.Sci. Electives[1]	9
	16		**15**

Minimum Hours Required for Graduation: 122

[1]Humanities and Social Science and Other Requirements (21 hours minimum). All courses must be completed with regular grading.
a Select two courses from the list of history courses or two courses from the list of literature courses. The literature courses should be selected from the same language.
b. Select one course from the list of philosophy, religion, or visual/performing arts courses.
c. Select two courses from any one of the following social science areas: anthropology, cultural geography, economics, politics and government, psychology, sociology.
d. Select one course from the list of science, technology and society courses (humanities and social science perspective).
e. Select one course from any of the disciplines of humanities and social sciences.
f. At least one of the above seven (7) courses must focus on a non-English speaking culture.
g. Competency in a foreign language at the 102 level is required for graduation.
[2]Physical Chemistry/Thermodynamics (6 hours). CH 431 and CH 433 or TC 441 and TC 442.
[3]Restricted Elective (3 hours). Choose any T, TC, TES, TMS or TT course.

CURRICULUM IN TEXTILE CHEMISTRY
POLYMER CHEMISTRY CONCENTRATION
Degree earned: B.S. in Textile Chemistry

FRESHMAN YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
CH 101 Chemistry - A Molecular Science	3	CH 201 Chemistry - A Quantitative Science	3
CH 102 General Chemistry Lab	1	CH 202 Quantitative Chemistry Lab	1
ENG 111 Comp. & Rhetoric	3	ENG 112 Comp. & Reading	3
MA 141 Calculus I	4	MA 241 Calculus II	4
Any 100-level PE in Fitness & Wellness	1	TC 203 Intro. to Polymer Chemistry	3
TC 105 Intro. to Text & Computers	3	Physical Education Elective	1
	15		**15**

SOPHOMORE YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
CH 221 Organic Chemistry I	4	CH 223 Organic Chemistry II	4
MA 242 Calculus III	4	MA 341 Appl. Diff. Equations I	3
PY 205 Physics for Engr. & Sci. I	4	PY 208 Physics for Engr. & Sci. II	4
TMS 211 Intro. to Fiber Sci.	3	TC 301 Technology of Dyeing & Finishing	4
	15		**15**

JUNIOR YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
TC 461 Intro. to Fiber-Forming Polymers	4	TC 305 Intro. to Color Sci. & Its Applic.	3
TMS 210 Yarn & Fabric Form & Properties	4	TC 412 Textile Chemical Analysis	3
Humanities/Soc.Sci. Elective[1]	3	Humanities/Soc.Sci. Electives[1]	6
ST 370 Prob. & Statistics for Engr.	3	ENG 333 Comm. for Sci. & Research or	
Phys. Chemical/Thermdyn. Elective[2]	3	ENG 331 Comm. for Engr. & Technology	3
	17	Physical. Chemical/Thermdyn. Elective[2]	3
			15

SENIOR YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
Dyeing & Finishing Elective[3]	3	TC 401 Environ. Sci. Text.	3
Humanities/Soc.Sci. Electives[1]	3	TC 466 Polymer Chemistry Lab	3
Polymer Chemistry Electives[4]	6	Humanities/Soc.Sci. Electives[1]	6
	15	Polymer Chemistry Elective[4]	3
			15

Minimum Hours Required for Graduation: 122

[1]Humanities and Social Science and Other Requirements (21 hours minimum). All courses must be completed with regular grading.
a Select two courses from the list of history courses or two courses from the list of literature courses. The literature courses should be selected from the same language.
b. Select one course from the list of philosophy, religion, or visual/performing arts courses.
c. Select two courses from any one of the following social science areas: anthropology, cultural geography, economics, politics and government, psychology, sociology.
d. Select one course from the list of science, technology and society courses (humanities and social science perspective).
e. Select one course from any of the disciplines of humanities and social sciences.

f. At least one of the above seven (7) courses must focus on a non-English speaking culture.
g. Competency in a foreign language at the 102 level is required for graduation.
[2]Physical Chemistry/Thermodynamics (6 hours). CH 431 and CH 433 or TC 441 and TC 442.
[3]Dyeing and Finishing Elective (3 hours). Choose any one of the following courses: TC 310, TC 320, TC 407, TC 505, TC 506, TC 520, TC 521, TC 530, or TC 591. (NOTE: GPA and pre-requisite restrictions may apply to the graduate courses. Consult the catalog and the instructor.)
[4]Polymer Chemistry Electives (9 hours).
a. Choose 6 hours from the following: T 402, TMS 460, TC 504, TC 561, TC 562, TC 565, and TC 569.
b. Choose 3 hours from either the list above or the following: T 493, T 497, T 498 (1–3 hours), TC 490, TC 591.
(NOTE: GPA and prerequisite restrictions may apply to the above courses. Consult the catalog and the instructor.)

CURRICULUM IN TEXTILE CHEMISTRY
GENERAL STUDIES CONCENTRATION
Degree earned: B.S. in Textile Chemistry

FRESHMAN YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
CH 101 Chemistry - A Molecular Science	3	CH 201 Chemistry - A Quantitative Science	3
CH 102 General Chemistry Lab	1	CH 202 Quantitative Chemistry Lab	1
ENG 111 Comp. & Rhetoric	3	ENG 112 Comp. & Reading	3
MA 141 Analytic Geom. & Calculus I	4	MA 241 Analytic Geom. & Calculus II	4
Any 100-level PE in Fitness & Wellness	1	TC 203 Intro. to Polymer Chemistry	3
TC 105 Intro. to Text & Computers	3	Physical Education Elective	1
	15		**15**

SOPHOMORE YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
CH 221 Organic Chemistry I	4	CH 223 Organic Chemistry II	4
MA 242 Analytic Geom. & Calculus III	4	MA 341 Appl. Diff. Equations I	3
PY 205 Physics for Engr. & Sci. 1	4	PY 208 Physics for Engr. & Sci. II	4
TMS 211 Intro. to Fiber Sci.	3	TC 301 Technology of Dyeing & Finishing	4
	15		**15**

JUNIOR YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
CH 431 Physical Chemistry I	3	CH 433 Physical Chemistry II	3
CH(TC) 461 Intro. Fiber-Forming Polymers	4	TC 305 Intro. Color Sci. & Applic	3
ENG 331 Comm. for Engr & Technology or		TC 412 Textile Chemical Analysis*	3
ENG 333 Comm. for Sci. & Research	3	TC 401 Environ. Science Textiles	3
Humanities/Soc.Sci. Elective[1]	3	Humanities/Soc.Sci. Elective	3
TMS 210 Yarn/Fabric Form & Prop.	4	Humanities/Soc.Sci. Elective	3
	17		**18**

SENIOR YEAR

Fall Semester	*Credits*	*Spring Semester*	*Credits*
CH 401 Systematic Inorganic Chemistry I	3	Advanced TC Elective[4]*	3
Adv. Chemistry Elective[2]*	3	TC 466 or TC 407 (Capstone*)	3
Polymer Chemistry Elective[3]	3	Dyeing/Finishing Elective[5]	3
Humanities/Soc.Sci. Electives (two courses)	6	Humanities/Soc.Sci. Electives (two courses)	6
	15		**15**

Minimum Hours Required for Graduation: 125

**Graduates Certified by the American Chemical Society
[1]Humanities and Social Science and Other Requirements (21 hours minimum). All courses must be completed with regular grading.
a Select two courses from the list of history courses or two courses from the list of literature courses. The literature courses should be selected from the same language.
b. Select one course from the list of philosophy, religion, or visual/performing arts courses.
c. Select two courses from any one of the following: anthropology, cultural geography, economics, politics and government, psychology, sociology.
d. Select one course from the list of science, technology and society courses (humanities and social science perspective).
e. Select one course from any of the disciplines of humanities and social sciences.
f. At least one of the above seven (7) courses must focus on a non-English speaking culture.
g. Competency in a foreign language at the 102 level is required for graduation.
[2]CH 403, CH 415/416, CH 434, CH 435, PY 407, or any CH 500-level course except CH 530.
[3]T 402, T 492, TMS 460, TC 504, TC 505, TC 506, TC 525, TC 561, TC 562, TC 565, TC 569.
[4]TC 490, TC 505, TC 525, TC 561, TC 562, or any other TC course with a physical chemistry prerequisite.
[5]TC 310, TC 320, TC 490, TC 506, TC 520, or TC 530.

MINOR IN TEXTILE CHEMISTRY
The Textile Engineering, Chemistry, and Science Department offers a minor in textile chemistry to majors in any field except Textile Chemistry. The program is designed to expose students to the technical and scholarly disciplines of polymer chemistry, fiber formation, color physics, dyeing, and chemical modification of fabrics, and gives them an opportunity to learn how basic disciplines are applied in an industrial environment. Any interested student should contact the associate department head of Textile Engineering, Chemistry, and Science for information about the minor and its prerequisites.

B.S. DEGREE IN TEXTILE ENGINEERING
(See Textile Engineering curriculum in College of Engineering.)

COLLEGE OF VETERINARY MEDICINE

4700 Hillsborough Street
NCSU Box 8401
Raleigh, NC 27695-7701
Fax: (919) 513-6452

Admissions: *(919)513-6205*
Recruitment: *(919)513-6205*
Academic Affairs: *(919)513-6212*
E-mail: vetmed@nscu.edu

O. J. Fletcher, *Dean*
D. J. DeYoung, *Associate Dean and Director of Veterinary Services*
D. G. Bristol, *Associate Dean and Director of Academic Affairs*
N. C. Olson, *Associate Dean and Director of Graduate Studies & Research*
R. E. Fish, *Director of Laboratory Animal Resources*
C. A. DeLuca, *Director of Admissions and Graduate Programs*

COLLEGE OF VETERINARY MEDICINE:

General Information
No specific undergraduate degree track is associated with a pre-professional veterinary medicine program. Faculty members from the College of Agriculture and Life Sciences serve as advisors to undergraduate students interested in Veterinary Medicine that are enrolled and pursuing a baccalaureate program usually in a science-related field. Pre-professional course requirements are listed below. After completion of the required courses, students may be eligible to apply for the professional veterinary program. Course requirements may be changed annually and are determined by the Committee on Admissions in the College of Veterinary Medicine.

Undergraduate students with interest in veterinary medicine are **expected to be pursuing a baccalaureate degree** (to include the social science and humanities requirements in the appropriate curriculum). Minimum requirements and course stipulations for curriculum planning should be followed through each of the students and their pre-professional advisors to be knowledgeable of those requirements.

All courses listed below should be completed by the time of application to the veterinary college except two courses may be pending completion in the spring semester, term, or quarter, of the year of application.

PRE-PROFESSIONAL COURSE REQUIREMENTS

ANS 230 Applied Animal Nutrition	3	GN 411 Prin. of Genetics	4
or PO (NTR/ANS)415 Comparative Nutrition	3	MA 131 Calculus Life Management	3
BCH 451 Introductory Biochemistry	4	or MA 121 Elements of Calculus	3
BIO 125 General Biology	4	MA 141 Calculus I	4
or BIO 183 with Lab	4	MB 351 General Microbiology	4
CH 101 General Chemistry I and CH 102	4	MB 352 Gen. Microbiology Lab	1
CH 201 General Chemistry II and CH 202	4	PY 211 College Phyics I and Lab	4
CH 221 Organic Chemistry I with Lab	4	PY 212 College Physics II and Lab	4
CH 223 Organic Chemistry II with Lab	4	ST 311 Intro. to Statistics	3
ENG 111 Comp. and Rhetoric	3	Humanities Electives	6
ENG 112 Comp. and Reading	3	Social Sciences Electives	6

PROFESSIONAL DEGREE PROGRAM AND CAREER OPPORTUNITIES
Veterinary medicine is a science career dealing with the recognition, treatment, control and prevention of diseases in animals. Career options are unlimited and varied as animal health affects the health and economic welfare of the nation. DVM candidates may select several career options upon graduation. Federal government, private industry, private practice, and research and teaching activities in a university setting are all possible for licensed graduates. Successful completion of the professional training program should prepare students for appropriate North Carolina state licensing examinations. Persons interested in the professional courses offered may receive a brochure by contacting the College of Veterinary Medicine, Office of Student Services, Raleigh, NC or view the college website at: http://www2.ncsu.edu/ncsu/cvm/instruction/admissions/

DEPARTMENT OF ANATOMY, PHYSIOLOGICAL SCIENCES AND RADIOLOGY
Phone: (919) 513-6220

A. L. Aronson, *Head*

Professors: K. B. Adler, R.A. Argenzio, A.L. Aronson, J. H. Britt, C. F. Brownie, L.N. Fleisher, N. C. Olson, J. E. Riviere, P.L. Sannes, J. E. Smallwood, C. S. Teng, D. E. Thrall; *Professors Emeriti:* P. J. Bentley, T. M. Curtin, C. E. Stevens; *Director:* P. Fisher, *Associate Professors:* H. M. Berschneider, J. E. Gadsby, L.C. Hudson, N. E. Love, R.E. Meyer, M.G. Papich, B.P. Peters, C.L. Robinette, I. W. Smoak, K.A. Spaulding, C.R. Swanson, *Assistant Professors:* C. R. Berry, W. Horne; *Visiting Assistant Professor:* J. P. Douglass; *Research Professor:* M.C. McGahan, *Research Associate Professor:* J. Horowitz; *Research Assistant Professor:* J. Allen; *Instructor:* J. Khosla.

DEPARTMENT OF COMPANION ANIMAL AND SPECIAL SPECIES MEDICINE
Phone: (919) 513-6230

E. A. Stone, *Head*

Professors: C.E. Atkins, E.B. Breitschwerdt, S.E. Bunch, M.G.Davidson, D.J. DeYoung, R.B. Ford, E.M.Hardie, N.A. Monteiro-Riviere, E.J. Noga, R.L. Page, E.A.Stone, M.K. Stoskopf; *Associate Professors:* R.E.Fish, K.Flammer, B.C. Gilger, E.C. Hawkins, B.W. Keene, S.G.Price, S.C.Roe, N.J.H.Sharp, S.L.Vaden; *Assistant Professors:* L.A. Degernes, B. D. Hansen, H.A.Jackson, G.A. Lewbart, D.J. Marcellin, K.G.Matthews, K.R.Munana, B.S.Nwadike, T.J.Olivry; *Visiting Assistant Professor:* R.M.Linnehan, *Clinical Assistant Professors:* T.C.DeFrancesco, M. L. Hauck, M, W. Jackson; *Visiting Clinical Instructor:* L. E. Williams.

DEPARTMENT OF FOOD ANIMAL AND EQUINE MEDICINE
Phone: (919) 829-4240

M. C. Roberts, *Head*

Professors: G.W. Almond, K.L. Anderson, H.J. Barnes, D.H. Ley, W.D. Oxender, M.C. Roberts, L.P. Tate; *Associate Professors:* K.F. Bowman, B.A. Breuhaus, D.G. Bristol, P. R. Davies, J. Deen, E.Hunt, M.M. McCaw, G.M. Rogers, B.D. Slenning, J.P. Vaillancourt, S. Van Camp, D.P. Wages, M. D. Whitacre; *Assistant Professors:* P. Farin, S. Gardner, S. Jones, S.L. Vivrette; *Clinical Assistant Professor:* W.R. Redding, *Research Assistant Professor:* A.T. Blikslager, *Visiting Instructors:* A.L. Cannedy; *Swine Extension Specialist:* M. Morrow; *Poultry Extension Specialist:* D. Carver; *Ruminant/Production Specialist:* J.M. Moore, *Adjunct Associate Professors:* D.V. Fernandez, E.C. Gonder, L.L. Munger, D.V. Rives, A.B. Scheidt, A.R. Sharpton, *Adjunct Assistant Professor:* T.J. McGinn.

DEPARTMENT OF MICROBIOLOGY, PATHOLOGY, AND PARASITOLOGY
Phone: (919) 513-6250

L.E. Perryman, *Head*

Professors: T.T. Brown Jr., P.B. Carter, J.M. Cullen, E.V. DeBuysscher, F. J. Fuller, J.S. Guy, B. Hammerberg, M.G. Levy, D.J. Meuten, P.E. Orndorff, L.E. Perryman, M.B. Tompkins, W. Tompkins; *Adjunct Professors:* J.K. Atwell, R. Johnston, J. H. MacCormack, R.R. Maronpot, J.E. Newbold, R.R. Pool, M. Selgrade; *Professors Emeriti:* E.G. Batte, H.A. Berkhoff, L. Coggins, R.C. Dillman, D.J. Moncol; *Associate Professors:* P. Cowen, C.B. Grindem, J.Levine, B. Sherry, S.L. Tonkonogy; *Visiting Associate Professor:* S Kennedy-Stoskopf; *Adjunct Associate Professors:* G. Boorman, G. R. Burleson, R.C. Cattley, P.A. Foster, T.J. Goldsworthy, J. F. Hardisty, W.F. MacKenzie, P. Mann, E.E. McConnell, K.T. Morgan, R. Peiffer, C.D. Wolf, J.Wright; *Assistant Professors:* C. Altier, P. Arasu, M.T. Correa, G. Dean, J. Law, R. Miller; *Adjunct Assistant Professors:* B. Davis, J. Everitt, M. Stebbins, M.R. Wells; *Visiting Research Professor:* E.A. Havell, *Research Assistant Professor:* J.M. Andrews, *Director of Electron Microscopy:* M.J. Dyskstra; *Instructor:* J.R. Flowers, *Visiting Assistant Professor:* R. English; *Visiting Instructors:* K.M. Whitney; *Scientist:* P. Spears; *Associate Members of Faculty:* J.J. Arends, S.M. Laster, M. Qureshi; *Research Associate:* S. Simpkins.

DIVISION OF UNDERGRADUATE STUDIES

Leazar Hall
NCSU Box 7105
Raleigh, NC 27695-7105

Phone: (919) 515-3037
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J. A. Anderson, *Dean*
T. E. H. Conway, *Associate Dean*
Jo Allen, *Assistant Dean*

Undergraduate Studies Staff: E.W. Alexieff, J. Allen, D. Anders, J.A. Anderson, F.A. Artis, A.M. Atkin, A.M. Barnes, A.S. Bell, J.Bong, M.L. Bowden, A. Bryant, J.T. Callahan, R.A.. Callanan, P.A. Cellini, C.N.Chafin, M.L. Clarkson, T.E.H.Conway, C. Christopher, J.L. Dockery, S.D. Foley, K.W.Gattis, R.L.Green, J.Hawkins-Morton, W.T.Hollomon, M.A. Jernigan, G.W. Johnson, S. Jones, B.D.Koehler, J.R. Lackey, S.S.Lamb, W.T. Little, A.F.Mann, S.J.Matney, R.McGraw, L.R. McLaughlin, R.L.Mimms, P.H. Mohr, P.A. Moses, C. Newkirk White, J.E.Odom, K.M.Proulx, D.E.Royal, J.A. Robinson, B.A.Soloman, C.R. Stonehouse, A.B. Taylor, M.A.Tetro, A.S.Ugbaja, B.B.Windom.

The Division of Undergraduate Studies was formed in 1990 as a means to provide for the coordination of several programs designed to increase the retention and graduation rates of NC State undergraduates and to provide a focal point for new programs to enhance the undergraduate experience. The Division consists of several programs which are briefly described below.

THE FIRST YEAR COLLEGE

Tucker Hall
T. E. H. Conway, *Director*

The First Year College at NC State University was established to provide a logical point of entry for students who are undecided about their choice of major, but interested in the institution's mix of science, technology, professional and liberal studies offerings.

The program employs a student-centered approach to the development of an effective teaching and learning environment. As part of that effort the First Year College takes into account critical adjustments necessary for successful transition from the demands of high school to those of college. Based on a cognitive-developmental model, which argues, "It is the total university experience that results in growth," the program is designed to bring into closer alignment the in-class, and out-of-class experiences of students. Housed administratively in the Division of Undergraduate Studies and physically in an undergraduate residence facility, the program seeks to provide students with the intellectual environment to achieve academic success through active involvement and responsibility for their own learning.

At the core of the program are the elements of access to quality academic advising, formal and informal interactions with University faculty, support from academically successful upper-class students, guided exploration of the University and its colleges, structured reality-based discussions of issues associated with transition from high schhol to college, and deliberate reflection on the cultural and social offerings available at the University. These elements are addressed through an orientation course taught each semester of the freshman year, specially programmed residence halls, and the Faculty Fellows Program, through which faculty from across the University volunteer wo work in various capacities with First Year College students and advisers.

ACADEMIC SUPPORT PROGRAM FOR STUDENT ATHLETES

Reynolds Coliseum
P. Moses, D*irector*

The academic support program for student athletes is designed to provide academic support for more than 500 undergraduate and graduate students who represent nc state in ncaa competition. All students athletes are provided with advising and counseling support in order to allow students to balance the rigors of the academic course work with the rigors of competition at the ncaa division i level.

NEW STUDENT ORIENTATION PROGRAM

R. A. E. Callanan, *Director*

New Student Orientation, a component of the Division of Undergraduate Studies, provides assistance to newly admitted first year and transfer undergraduate students. The primary focus is on students' transition to NC State. Twelve (12) Orientation sessions, scheduled during June and prior to each fall and spring semester, coordinate access and interaction of students with both academic and student affairs' resources. The goal of orientation is to expose students to broad educational opportunities

and to begin the process of integrating them into the life of the institution, thus promoting their ability to maximize the benefit of a successful college experience.

For more information, contact:
New Student Orientation
Voice: 919/515-1234, FAX:919/515-5844
Internet: www2.ncsu.edu/ncsu/undergrad_studies/
Mail: New Student Orientation, Ncsu, Box 7525, Raleigh, Nc 27695-7525

UNDERGRADUATE STUDIES TUTORIAL CENTER

A. F. Mann, *Director*

The Undergraduate Studies Tutorial Center provides academic assistance to undergraduates enrolled in many 100- and 200-level mathematics, science, and language classes. Students can choose to meet weekly with a one-on-one assigned tutor. Students can also meet with one-on-one Sign-Up tutors by appointment or use available drop-in services. Supplemental Instruction (SI) leaders provide weekly help sessions for students in selected large lecture classes.

UNIVERSITY COOPERATIVE EDUCATION PROGRAM

Peele Hall, Room 212
A. S. Bell, *Director*

The University Cooperative Education Program is designed to be an integral part of a student's educational program and is offered in all colleges. The co-op program enriches and expands classroom learning by providing sponsored, paid work assignments in industry, business and government. Work experience is selected based on its relevance to a student's major or career goals and provides for alternating semesters of study and full-time work. A parallel plan (part-time study and part-time work) is also available as an option in several colleges. Co-op participation does not constitute an interruption of college work.

The co-op experience normally takes place during the sophomore and junior years and means that attaining a degree will take more than eight semesters. A minimum grade point average of 2.25 is required for students entering this program. Freshmen are not eligible, and transfers must first complete at least one semester at NC State. All students must have been admitted to a degree program. To remain in the program, students must maintain a minimum cumulative average of 2.0, agree to participate for a minimum of 12 months of full-time work experience or its equivalent, and be registered for co-op each work period.

THE NC STATE WOMEN'S CENTER

Frances D. Graham, *Coordinator*

"Celebrating Women 365 Days a Year!"

The NC State Women's Center, located in 3120 Talley Student Center, serves as a resource and referral center for campus and community programs and services for and about women and gender equity issues. The mission of the Center is to: promote, support, and empower women on campus; advocate for a university environment which eliminates barriers, diminishes prejudice and bigotry and extends a supportive climate to all women; increase awareness and understanding of multicultural women's concerns and gender equity issues, including an emphasis on how these issues affect both women and men; provide visibility for women, women's concerns, and women's contributions.

The NC State Women's Center provides resources for women and men at a time when gender roles are changing within the NC State University community and society at large. Emphasis is placed on empowering women as leaders and agents of change on campus with particular concern for issues of sexual violence, race, ethnicity, class, national origin, physical challenge/disability and sexual orientation. Specific programs, services, or student groups, such as the Student Advisory Committee, REAL (Rape Educators and Active Leaders), and Wolfpack N.O.W. are designed to provide students with peer support, leadership experiences, and positive role modeling. Such experiences create support networks for women students (many of whom are pursuing careers in fields not traditionally open to women), promote personal growth, and encourage a positive gender identity.

Programs reflect a wide range of viewpoints about women's issues and gender equity. They are designed to increase understanding of gender issues, empower women to explore options in their lives, and motivate both women and men toward greater involvement in these issues. The Women's Center offers an array of programs for students throughout the school year, especially during Women's History Month in March.

The Molly Hays Glander Rape & Sexual Assault Advocates Response Line is available 24 hours a day, seven days a week. Advocates are trained volunteers who provide caring, confidential support as well as resources, referrals and information for

survivors of rape and sexual assault. Anyone who is dealing with a rape or sexual assault may call an Advocate for help and assistance. To reach an Advocate, call the Rape and Sexual Assault Response Line at 218-9102. Further, the office provides confidential assistance, information, and referrals for sexual harrassment, sexual assault and domestic/relationship violence.

For more information contact Frances D. Graham, Ph.D., Coordinator of the Women's Center, 3120 Talley Student Center at 515-2012 or via email: Frances_Graham@ncsu.edu.

THE GRADUATE SCHOOL
Peele Hall
D. W. Stewart, *Dean*
R. S. Sowell, *Associate Dean*
M. F. King, *Associate Dean*

The Graduate School provides instruction and facilities for advanced study and research in the fields of agriculture and life sciences, design, education and psychology, engineering, forest resources, humanities and social sciences, management, physical and mathematical sciences, textiles, and veterinary medicine.

The school is currently composed of more than 2,000 graduate faculty members within the ten colleges. Educated at major universities throughout the world and established both in advanced teaching and research, these scholars guide the University's graduate student body of some 5,150 men and women from all areas of the United States and many other countries.

The faculty and students have available exceptional facilities including libraries, laboratories, modern equipment, and special research areas.

For a list of graduate degrees offered at NC State and details on programs and admissions, consult the Graduate Catalog.

MILITARY EDUCATION AND TRAINING

DEPARTMENT OF MILITARY SCIENCE (ARMY ROTC)
LTC David Cannon, *Professor*

Instructors: Major A. F. Knights, Captain D. Marks, Captain C. Gosselin, Master Sergeant C. Harris, Sergeant First Class J. Perez

Mission. The mission of the Army ROTC Program is to train college men and women to become commissioned officers in sufficient numbers to meet Active Army, Army Reserve, and National Guard requirements.

Program of Instruction. The Army ROTC program consists of a voluntary six-semester-hour Basic Course (freshmen and sophomore level) and a two-year Advanced Course (junior and senior level) which includes a six week camp in the summer prior to the senior year.

One may enter the Advanced Course without participating in the Basic Course by any of the following methods:

Simultaneous Membership Program (SMP): Members of Reserve or National Guard units may take advantage of this program and, if accepted, enroll directly into the Advanced Course. SMP participants will be assigned to a unit near NC State or home for part-time monthly officer training and will receive the ROTC Advanced Course subsistence payment of $150 per month, plus approximately $150 per month for the one weekend of Reserve or Guard training. In addition, two weeks of Annual Training will be required for which the individual will receive full pay.

Prior Service: Service veterans are eligible for placement into the Advanced Course.

Basic Summer Camp: Successful completion of the five week basic summer camp, held at Ft. Knox, Kentucky, is an alternative to the Basic Camp.

Transfer Credit: Students entering as transfer students from other institutions may receive credit for work completed at other Senior ROTC units.

Junior ROTC: Students who have participated in a Junior ROTC in high school may receive placement credit as determined by the Professor of Military Science.

Eligibility: All full-time freshmen and sophomores may enroll in any Military Science Basic Course offering without obligation to the Army. To be eligible for participation in the Advanced Course, applicants must be in good academic standing and demonstrate satisfactory performance in the Basic Course. Additionally, applicants for commissioning must be able to be commissioned by their 30th birthday; however, an age waiver may be obtained as long as the individual will be

commissioned prior to his or her 34th birthday. A student must have a minimum of two years remaining as a full-time student at either the undergraduate or graduate level.

Professional Military Education: There are five Professional Military Education (PME) courses which must be taken or have an approval of a waiver obtained for them. All but one content area (Military History) are automatically met by completion of the University's General Education Distribution requirements. PME requirements must be completed or waived prior to commissioning.

Delays for Graduate Study: Qualified ROTC graduates may delay their entry into active service in order to obtain advanced academic degrees. Fellowships for advanced academic study are available to selected ROTC graduates, allowing up to two years of graduate study while receiving full pay and allowances plus payment for tuition, all fees, textbooks and required supplies.

Financial Aid: Army scholarships of two to four years which pay for tuition, all fees and textbooks are available on a competitive basis to students who are strongly motivated and academically qualified. Students in the Advanced Course who are preparing for commissioning receive a subsistence allowance of $100 per month (tax free) up to a maximum of $2000. All Advanced Course cadets are paid approximately one-half the basic pay of a second lieutenant, while attending the six-week Advanced Camp, plus travel allowances to and from camp.

Service Opportunities: Scholarship recipients may serve four years active duty upon commissioning or eight years in the United States Army Reserve or National Guard. Service consists of one weekend drill per month and two weeks annual training.

Program Features: Army ROTC classes are unique, offering instruction and a practical, working knowledge of leadership. Students are challenged early in their ROTC training to enable them to develop sound judgement, the desire to achieve, acceptance of responsibility, personal confidence, and to learn the principles of personnel management. The primary vehicle for this training during the academic year is Leadership Laboratory, where cadet officers and non-commissioned officers conduct instruction under the supervision of the Military Science Department's faculty. The intensive summer Advanced Camp is extremely effective in developing one emotionally, mentally and physically. All Army ROTC training is focused on preparing the student to meet the challenges of tomorrow's society, whether in a military or civilian career.

Distinguished Military Students: The University names outstanding Army ROTC students as Distinguished Military Graduates.

Uniforms: Uniforms for Army ROTC are provided by the federal government.

Departmental Offices: Our Administration Office is located in Room 145, Reynolds Coliseum.

DEPARTMENT OF AEROSPACE STUDIES (AIR FORCE ROTC)

Colonel Robert Ostrander, *Professor*

Instructors: *Captain J. Doyle, Captain K. Gulden, Captain B. Lambert*

AFROTC Program. There is a four-year and a two-year program that leads to a commission in the United States Air Force (USAF).

The four-year program allows freshmen to enroll in Aerospace Studies courses in the same manner as other college courses for the first two years. Students take these courses as free electives and incur no military obligation unless they are receiving an AFROTC scholarship. These first two years are called the General Military Course (GMC). The last two years of AFROTC comprise the Professional Officer Course (POC). Non-AFROTC sophomore students may compete with GMC cadets for a position in the POC and obtain a commission under the two-year program.

The two-year program is available to those who do not take the first two years of Air Force ROTC. Interested students must contact the Professor of Aerospace Studies early in the first semester of their sophomore year. Accepted students will attend a five-week summer field training encampment.

Students at every level have numerous opportunities to further their knowledge of the Air Force as well as their leadership ablilities. A variety of programs during the summer allow freshmen to visit bases, or participate in programs such as the US Air Force Academy Free Fall program, soaring, combat survival, and numerous other possibilities. POC students have similar opportunities, focusing primarily on programs related to the cadet's desured active duty career area, both in the U.S. and abroad. Through the school year, cadets have opportunities to examine all aspects of life in the Air Force and gain leadership experience through Air Force base visits, flying opportunities, and social activities.

Upon graduation and satisfactory completion of the POC, the student is commissioned a second lieutenant in the USAF and is obliged to serve a minimum of four years on active duty.

All students who complete the academic program of study receive a Military Studies minor. This applies even to students who are not pursuing a military commission. Contact the Aerospace Studies department for more details.

Financial Aid. Air Force ROTC students are encouraged to apply for scholarships for two or three years. Scholarships pay for tuition, fees, books, and provide students $150 per month during the academic year for miscellaneous expenses. Scholarships are awarded by the Air Force based primarily on college academic achievement. POC cadets not receiving nay other Air Force scholarship receive a $1,725/semester scholarship called POC Incentive, or POCI. All scholarships have minimum academic standards that must be maintained.

Students in the GMC, other than scholarship students, receive no monetary allowance. All POC students receive $150 per month during the academic year.

Curriculum. The AFROTC educational program provides professional preparation for future Air Force officers. Courses in the first two years focus on Air force missions and organization, other military services, and the history of airpower. The focus in the last two years is on leadership and management and an in-depth examination of national security, American defense strategy, and the methods for managing conflict. A progressive development of communicative skills, oral and written, is integrated into each course. Officership is developed through leadership laboratory, traditional military social functions, base orientation trips, and cadet-centered programs.

Eligibility. All full-time freshman and sophomores may enroll in the GMC without obligation to the Air Force. To enter the POC students must pass an Air Force Officer Qualifications Test, meet physical and academic requirements, and be selected by the Professor of Aerospace Studies and Air Force ROTC headquarters. In addition, some age restrictions apply; contact the department for more details. Students desiring to enter the four-year program simply register for the freshman Aerospace Studies course. Other students should contact the ROTC office on campus in Room 141 Reynolds Coliseum (919) 515-2417; or write to: Professor of Aerospace Studies, NC State, Box 7308, Raleigh, North Carolina 27695-7308.

Organization. The AFROTC Corps nicknamed "Wolfpack Warriors," is organized as a cadet wing staffed entirely by cadets for leadership development. They are assisted and advised by the instructors. Two collateral organizations, Arnold Air Society and drill/color guard teams, support the wing organization as well as the university.

Uniforms. Uniforms are provided by the federal government and are only worn on the day of Leadership Laboratory or as specified by the cadet corps leadership.

Internet Access. To view the Air Force ROTC website, point your browser to:

http://www2.ncsu.edu/ncsu/airforce_rotc/main.html **or** http://www2.ncsu.edu/ncsu/airforce_rotc/

NAVAL SCIENCE (NAVAL ROTC)

Captain Douglas B. Guthe, Jr., *Professor of Naval Science*

Associate Professor: LtCol Thomas C. Ceci; *Instructors:* Maj Randall Connare, LT Kerry Hennessey, LT Darren Poore, LT Oscar Cuellar

Mission. The purpose of Naval Reserve Officers Training Corps is to develop midshipmen mentally, morally, and physically and to imbue them with the highest ideals of duty, honor, and loyalty in order to commission college graduates as naval officers who possess a basic professional background, are motivated toward careers in the naval service, and have a potential for future development in mind and character so as to assume the highest responsibilities of command, citizenship, and government.

4-Year NROTC Program. There are basically two NROTC Programs leading to a commission as a Navy or Marine Officer upon graduation, the Scholarship Program and the College Program.

Scholarship Program. The Scholarship Program leads to a commission in the Navy or Marine Corps. For students who receive a Navy/Marine Corps scholarship, the Navy will pay tuition and fees, buy books, supply uniforms, and pay $150 per month tax-free subsistence allowance to help defray the cost of normal board at the University. During the summers between school years scholarship students will receive 4-6 weeks of at-sea training conducted on ships, submarines, and aircraft of the Navy's first line force. Upon graduation and commissioning, scholarship students are obligated to serve a minimum of four years on active duty.

College Program. For those students who are interested in a commission and do not desire a scholarship, or for those who are seeking an opportunity to qualify for a scholarship after entering NC State, the College Program is available. Selection for the College Program is made from students already enrolled at NC State, with applications being accepted and considered by the staff of the NROTC unit. Students enrolled in the College Program are provided uniforms and Naval Science textbooks. College Program students compete for selection to continue NROTC in Advanced Standing at the end of their

sophomore year. Selection is based on academic and demonstrated professional performance. Those selected for Advanced Standing receive $150 per month subsistence allowance during the final two years of the program. College Program midshipmen receive a single summer training cruise between the junior and senior year. Except for administrative differences, no distinction is made between the Scholarship and College Program midshipmen. The minimum active duty commitment following graduation for a College Program student is three years.

Students in the College Program are eligible to compete for scholarships at regular intervals. Most College Program students who have demonstrated above average academic and professional performance in the unit have received scholarships.

Two-Year Programs. The Two-Year Programs offer an opportunity to participate in NROTC during the final two years of University study. Both Scholarship and College Programs exist, offering the same advantages to the student having two years of college remaining as the respective four-year programs.

Applications for this program must be completed by March 15 prior to the starting year. Upon selection, the candidate attends a six-week training course at Newport, Rhode Island, during the summer between the sophomore and junior years so that he or she may receive instruction in the Naval Science subjects normally covered in the first two years at the University. Participants in this training course receive uniforms, room and board, and officer candidate pay during the period and, upon satisfactory completion of training, enter the NROTC program as third year students. The application process can be time consuming. In order to meet the March 15 deadline, students are encouraged to contact the Department of Naval Science before December 1 of their sophomore year.

The Marine Option. A limited number of quotas are available for students who wish to enter either of the NROTC Programs as Marine Officer candidates. For others who may decide upon a Marine Corps commission after joining NROTC, selection for the Marine Option may be made in the sophomore year. A midshipman's status as a Marine Option will result in some modifications to the curriculum and the final summer training period.

Curriculum. Due to the increasingly advanced technologies being employed by the Navy and Marine Corps, candidates for Navy Commissions are encouraged to select academic majors in mathematics, engineering, or scientific disciplines. However, each student in the NROTC program is free to choose his or her area of major study.

The NROTC training program emphasizes academics, leadership, military organization, and physical fitness. Required Naval Science courses are fully accredited, taken for free elective credit and include Naval Orientation, Engineering, Weapons Systems, Navigation, Naval Operations, and Leadership and Management. Marine Option midshipmen substitute Evolution of Warfare and Amphibious Warfare for selected courses. Additional University courses may be required depending upon one's major; however, all Navy option scholarship midshipmen must complete one year of calculus and physics. In addition to the courses taken for University credit, midshipmen will attend one leadership laboratory period each week.

Midshipmen Life. Academic excellence is emphasized throughout the NROTC Program with commensurate participation in the full range of campus extra curricular activities. The NROTC unit is organized as a midshipmen battalion to facilitate leadership development. The battalion is staffed entirely by midshipmen under the supervision of staff instructors. Additionally, midshipmen have opportunities to examine all aspects of life in the Navy and Marine Corps and gain leadership experience through field trips, summer cruise, sail training, and social activities. Further information regarding application for and admission into the NC State Naval ROTC may be obtained on campus in Room 102 Reynolds Coliseum or by writing to the Professor of Naval Science, Box 7310, NC State, Raleigh, North Carolina 27695-7310 or by calling (919) 515-2757.

The Department of Military Science (Army ROTC), the Department of Aerospace Studies (Air Force ROTC), and the Department of Naval Science (Naval ROTC) are separate academic and administrative subdivisions of the institution. Students in the ROTC programs will receive free elective credit for Aerospace Studies (AS), Military Science (MS), or Naval Science (NS) courses up to the limit of free electives in their curriculum.

DEPARTMENT OF MUSIC

Price Music Center (Office: Room 203)
Campus Box 7311
Raleigh, NC 27695-7311

Telephone: (919) 515-2981
FAX: (919) 515-4204
E-mail:robert_petters@ncsu.edu

R. B. Petters, *Director of Music*
J. C. Kramer, *Associate Director of Music*
Assistant Directors: R.M. Foy, J.A.Fuller, M.S. Lynch, A..E. Sturgis, P.H. Vogel, E.B. Ward

The Music Department is committed to providing broad-based educational opportunities for NC State students through a variety of musical experiences and introductory and upper-level academic courses. Departmental faculty seek to assist

students in developing musical insights, musical skills, and the capacity to perceive and respond to music in its historical and cultural contexts.

Opportunities for direct student participation as performers include many choral and instrumental organizations, which are described in detail under "Student Activities." Membership in any ensemble is open to students with a disciplined interest in music. Auditions are scheduled during summer orientation, at the beginning of each semester, and by appointment with the conductor of the group. For further information, please call the Music Department at 515-2981.

The department offers a variety of courses, most of which may be taken to fulfill specific general education requirements. Any course may be taken as a free elective. An eighteen-hour Music Minor is offered for qualified undergraduate students who wish to engage in the serious study of music. Emphases include performance, history/literature, and theory/composition.

The department also serves as a cultural resource for the university community and the public at large through concerts presented by student musical organizations, music faculty, and visiting artists. Concerts are open to students and the public.

DEPARTMENT OF PHYSICAL EDUCATION

Carmichael Gymnasium, Room 2000
J. Peel, *Head*

Professors Emeriti: F.R. Drews, R.A. Lauffer; *Associate Professors:* S.V. Almekinders, A. Attarian, A.L. Berle, J.V. Brothers, H.LBrown, K.L. Davis, J.L. DeWitt, T.W. Evans, R.G. Gwyn, S.C. Halstead, V.M. Leath, C.E. Patch, G.W. Pollard, T.C. Roberts, J.L. Shannon, R.R. Smith; *Associate Professors Emeriti:* N.E. Cooper, J.M. Daniels, J.B. Edwards, A.M.Hoch, H.Keating, W.R.Leonhardt, W.H.Sonner; *Assistant Professors:* I.F. Ormond, III; *Assistant Professors Emeriti:* R.C. CombsJ.W. Isenhour, Jr., M.S. Rhodes, W.M. Shea, E.A. Smaltz; *Lecturers:* J.K. Bartlett, R.N. Bechtolt, A.L. Bell, J.R. Carroll, W.A. Cheek, T.S. Dash, P.S. Domingue, T.D. Jones, S.M. Kehoe, R.H. Kidd, M.R. Lester, N.E.Lew, K.K. Lewis, R.L. McElroy, C.S. Ousley, B.C. Petty, S.T. Rogers, L.E. Scott, E.V. Smith, G.E. Wall, J.K. Wells, T.C. Winslow, G.R. Youtt; *Associate Members of the Faculty:* D.L. Ridgeway (Statistics and Physics), C.E. Stoddard.

All North Carolina State University students are required to complete two semesters of physical education to meet university requirements. Students must take any 100-level course in Fitness and Wellness as part of this requirement.

Students may participate in a sport they know or learn a totally new activity. Students with disabling conditions will be helped by physical education and Student Health Service professionals in choosing appropriate classes. Only "activity" courses, not elective "theory" courses, can be used to meet the university physical education requirement.

MINOR IN FITNESS LEADERSHIP

The Department of Physical Education offers a 17-hour minor in Fitness Leadership. It is designed to prepare students to assume fitness leadership responsibilities based on sound exercise research, fitness concepts, and theoretical history. The minor will provide knowledge of nutrition, anatomical, physiological and basic biomechanical principles; background in the prevention and treatment of athletic injuries; development and evaluation of fitness programs using various exercise modes and equipment; and demonstrations of the ability to apply the skills learned through a practicum experience. For additional information, contact Lynn Berle at 515-1057.

MINOR IN OUTDOOR LEADERSHIP

The Department of Physical Education offers a 17-hour minor in Outdoor Leadership which is designed for undergraduate students desiring to pursue careers as outdoor leaders of adventure-based programs or for those who wish to enhance their personal development and enjoyment. Students obtaining this minor will develop a foundation of essential leadership skills and experiences through course work focusing on outdoor skills, leadership training, and leadership experiences. For additional information, contact Terry Dash at 515-1392.

MINOR IN PHYSICAL EDUCATION - COACHING EMPHASIS

The Department of Physical Education offers a 19-hour Minor in Coaching Education designed to prepare students to assume coaching responsibilities with a sound theoretical background. The minor provides knowledge of pertinent anatomical, physiological, and biomechanical principles; appreciation for the prevention and treatment of athletic injuries; development of sports management skills; and demonstration of motor skills and strategies involved in coaching specific sports. For additional information, contact Charlie Patch at 515-6843.

OFFICE OF RESEARCH, OUTREACH, EXTENSION AND ECONOMIC DEVELOPMENT

Charles G. Moreland, *Vice Chancellor*
June M. Brotherton, *Associate Vice Chancellor for University Extension*
W. Mark Crowell, *Associate Vice Chancellor for Technology Transfer and Industry Research*
Russell Lea, *Associate Vice Chancellor for Research Administration and Sponsored Program Services*
John J. O'Neil, *Assistant Vice Chancellor for Research*

The Vice Chancellor for Research, Outreach, Extension and Economic Development acts for the Chancellor and Provost in the general administration of Research, Outreach, and University Extension Administration of the university.

The Vice Chancellor acts as the principal liaison representative between granting agencies and the university; assists faculty, department heads, and deans in identifying support for their research programs, preparing and processing proposals, negotiating contracts, grants and cooperative agreements and developing intercollegiate and interinstitutional research programs and projects; manages the technology transfer activities of the university; administers the allocation of faculty research and extension development funds; advises the Provost and Vice Chancellor on the coordination of intercollegiate and interinstitutional research programs and facilities; and, provides general information on all grant and contract activities.

The Vice Chancellor coordinates the efforts of all college outreach programs and assists the Chancellor and the Provost and Vice Chancellors in relations with those persons, organizations, and agencies (local, state, regional and national) that desire outreach services of the university.

The Vice Chancellor also coordinates the efforts of all college extension, outreach and public service programs and the Extension Operations Council. These efforts include developing communications networks across the state, aimed at determining the needs of citizens, local governments, business, industry and communities; facilitating development of programs of extension to address those needs; providing incentives for research in an area of need for which current knowledge and technology is lacking or insufficient; and providing recognition, rewards and incentives for faculty and professional staff involvement in extension and outreach activities.

CONTINUING STUDIES PROGRAMS

S. L. Kirsch, *Vice Provost*
The Division of Continuing Studies coordinates continuing education and distance learning programs across the university. Division Units assist in the identification of educational needs for non-traditional students, professionals, business, industry, and governmental agencies.

The office of Adult Credit Programs and Summer Sessions provides educational opportunities to over 8,000 people each year, many enrolling as lifelong education students and earning credits toward a degree. NC State utilized state-of-the-art technology-based distance learning: instruction via videocassette, cablevision, North Carolina-Research Education Network, satellite and Internet. The Division's Office of Instructional Telecommunications facilitates registration and coordinates off-campus distance education courses and programs serving all 100 counties in NC. The office also consults with faculty in developing their distance learning courseware. NC State offers over 120 credit courses at more than 500 locations around the world. Continuing and Professional Education conducts over 800 programs drawing more than 16,000 attendees representing businesses, industries and governmental agencies. The Computer Training Unit presently offers over 700 technology current courses serving more than 4,000 participants, primarily from NC businesses and units of government, each year. The Center for Urban Affairs and Community Services sponsors conferences and provides applied research impacting quality of life issues in North Carolina. University Environmental Programs serves as the catalyst and information-clearing house for all NC State's environmental programs. Each year Emerging Issues Forum brings the greatest authorities together to discuss and debate issues on the minds of the people which will effect future generations. The Encore Center provides enrichment classes, seminars and travel opportunities to active older adults.

The Division is located in the McKimmon Center, a conference and training facility serving over 115,000 adults annually.

DIVISION OF CONTINUING STUDIES

S. L. Kirsch, *Vice Provost*

Campus-wide coordination and communication for continuing education and distance learning are provided through the Division of Continuing Studies. The Division Units assist in the identification of educational needs for non-traditional students, professionals, business, industry, and governmental agencies.

The Division:

- Provides enrollment in day, evening and summer credit courses without formal admission to NC State.
- Augments on-campus classes with courses via correspondence, Internet, videocassette and cable, as well as on-site delivery.

- Customizes noncredit continuing education programs and courses to meet the professional development or training needs of business/industry, governmental agencies and nonprofit organizations.
- Delivers environmental programs and technical assistance on-campus and on-site.
- Trains the public and University staff in hands-on computer classes within dedicated computer teaching labs.
- Develops noncredit classes by and for older adults enrolled in a learning-in-retirement program.
- Arranges travel-study programs locally and abroad to enhance course topics related to social, economic, and political diversity around the world and at home.
- Creates special forums and programs to engage professionals, elected officials and layman in discussion and thought about significant public issues.
- Oversees needs assessment, market surveys, and program evaluations.
- Coordinates, reviews and approves planning of distance learning programs and courses.

ADULT CREDIT PROGRAMS AND SUMMER SESSIONS http://www2.ncsu.edu/acp/
J. F. Cudd Jr., *Director*
Phone: (919) 515-2265

Adult Credit Programs and Summer Sessions (ACP&SS) office provides access to the University's courses and programs to nontraditional students who are unable due to time, location and other restraints to take advantage of full-time, on-campus study.

- Adult students in the Triangle area register through ACP&SS as Lifelong Education (nondegree) students on a part-time basis into day and evening classes. ACP&SS promotes this opportunity to area citizens and provides advisement, registration, and referral services to registrants. Approximately 10% of the University's headcount is made up of this population -- many of whom eventually matriculate as regular, degree-seeking students.
- ACP&SS plays a key role in the overall administration of NC State's many and varied distance education/degree credit extension courses and programs. Student services to registrants-at-a-distance are coordinated through ACP&SS. All course registration, data collection, and liaison with UNC-GA and other constitutent campuses are coordinated here.
- ACP&SS administers NC State's Summer Sessions in which over 900 classes are taught to more than 13,000 students during two five-week sessions and a ten-week session. The Summer Sessions are designed to meet the needs of NC State's own degree-seeking students as they make progress toward completing their degrees. The Summer Sessions also attract a number of Summer Visitors from other colleges and universities who are drawn here by the breadth and depth of the course offerings.
- The Adult Services Office within ACP&SS is staffed by professional advisors who assist nontraditional students in their transition into university life. Academic advising, placement testing in mathematics, and career assessment services are provided by this unit.

CONTINUING AND PROFESSIONAL EDUCATION http://www2.ncsu.edu/cpe/
J. Hair, *Director*
Phone: (919) 515-2261 or 1-800-853-1760

In keeping with the land grant tradition of the university, Continuing and Professional Education (CPE) offers education and training to all the people. CPE encompasses the development, facilitation and delivery of continuing education and professional development programs for business, industry and other organizations, utilizing intensive learning experiences such as practical case studies, problem solving exercises, hands-on experience, displays, and presentations from experts in a wide variety of fields. Special efforts are made to meet the training needs of industry and government agencies through general as well as customized offerings.

The University awards Continuing Education Units (CEUs) to participants in qualified programs. Continuing Education Units are part of a nationwide recording system to provide a uniform measure of attainment in noncredit educational programs. The three units of CPE are:

PROFESSIONAL EDUCATION http://www2.ncsu.edu/cpe/
Alice Warren, *Associate Director*
Phone: (919) 515-4195

The Professional Education Unit develops, promotes and facilitates non-credit seminars, workshops and conferences to a broad market on a wide range of topics. Programs include: agriculture, communication, data processing, economics, education, engineering, forestry, management, the physical sciences, recreation, textiles and veterinary medicine.

COMPUTER TRAINING UNIT http://www2.ncsu.edu/ctu/
Betty Gardner, *Director*
Phone: (919) 515-3493

The Computer Training Unit (CTU) offers workshops to people who want to increase their knowledge of computer systems and software. Workshops designed to give students more hands-on experience and guided practice cover popular word processing, database management, spreadsheet, graphics, and desktop publishing packages at various skill levels. Follow-up telephone support is available to all workshop participants. The microcomputer training facilities at the McKimmon Center have three permanently installed labs equipped with Pentium computers with SVGA color displays and laser printer support, with just one student per computer.

THE MCKIMMON CONFERENCE AND TRAINING CENTER http://mckimmoncenter.ncsu.edu/
Kokeita Miller, *General Manager*
Phone: (919) 515-2277

The McKimmon Center provides the meeting facilities, audiovisual equipment and support sevices for adult educational programs. Administrative services are available to organizations that desire assistance in planning and implementing conferences, short courses and other educational activities. The Center accommodates small meeting groups and large national or international conferences. There are 13 meeting rooms (which can be divided into 20 areas) that can be arranged for any type or size audience ranging from a typical conference room to a 1100-person theater style hall. Three rooms are dedicated as Computer Training Unit teaching labs. Downlink teleconferencing and other technical services are available to enhance the total learning experience.

CENTER FOR URBAN AFFAIRS AND COMMUNITY DEVELOPMENT http://www.cuacs.ncsu.edu/
Y.S. Brannon, *Director*
Phone: (919) 515-1300

The Center for Urban Affairs and Community Services (CUACS) serves state and local governments of North Carolina by providing a focal point for bringing the research, educational and extension capabilities of NC State University to bear upon the problems faced by North Carolinians. CUACS is one of the leading applied researdh departments working with state government agencies. Furthermore, the Center is the only unit within NC State University with th mandate and capability to carry out large-scale applied survey reserch as it pertains to governmental programs and policies. CUACS facilitiates interaction between faculty and staff of NC State University and policy-making bodies in state, county and municipal organizations, and secondary schools and community colleges. The Center utilizes the expertise of university scholars, researchers and extension personnel as well as the expertise of community leaders and other professionals in the higher education.

INSTRUCTIONAL EDUCATION http://www2.ncsu.edu/oit/
Tom Russell, *Director*
Phone: (919) 515-7730

The Office of Instructional Telecommunications (OIT) provides coordination and leadership for th development and operation of systems and services for NC State's distance learning programs. OIT consults with faculty on their courseware production and delivery, and assists in content design. This office facilitates registration and student support services for courses offered by NC-REN, Cable, Internet, and Video programs. The office provides the design, specifications, and budgets for developing VideoClass facilities, CD-ROM and other delivery methods. Time and/or space-bound students can receive all or part of their university education through distance learning technologies. Sometimes referred to as distance education or distributed learning, this instruction reaches students on campus, at home, and at work in our communities, state, region, nation, and world.

This office offers degree-credit courses at both the undergraduate and graduate levels in the Humanities and Social Sciences, Physical and Mathematical Sciences, Agriculture and Life Sciences, Marine and Atmospheric Sciences, Physical Education, Engineering, Education and Psychology, and Management. More than 100 courses are now available on cable, Internet and video on a rotating basis, and may more are added each semester.

ENCORE CENTER FOR LIFELONG ENRICHMENT http://www2.ncsu.edu/encore/
D. S. Jackson, *Director*
Phone: (919) 515-5782

The Encore Center is designed to meet the educational and enrichment needs of older adults through non-credit courses, study-travel experiences, health and fitness programs and special events. In addition, Encore links mature adults with the services, facilities and applied research projects of the University and encourages member volunteerism in community-based

service projects. The integrity of Encore comes not only from the guidance of the Division of Continuing Studies, but also from the older members whose needs, interests, ideas and effort have given life and direction to Encore's mission:

> *...to provide opportunities for Lifelong Enrichment for people over 50 through education, intellectual stimulation and community involvement.*

Encore administrative offices and classroom facilities are located in the McKimmon Center.

EMERGING ISSUES FORUM http://www2.ncsu.edu/emerging_issues/
Betty Owens, *Director*
Phone: (919) 515-7741

The Emerging Issues Forum (EIF) represents the commitment of North Carolina State University to provide an arena where citizen leaders and policymakers representing government, business, education, and the scientific community can engage in deliberation and debate about compelling state, national, and international issues. Part conference, part think-tank, part service organization and clearinghouse, the Forum seeks to spur non-partisan discussion, to focus analytically on crucial issues, publications, speakers, mailing lists, and conference organization, planning and production.

UNIVERSITY ENVIRONMENTAL PROGRAMS http://www2.ncsu.edu/iete/
Robert Bruck, *Director*
Phone: (919) 515-8926
University Environmental Programs coordinates and often times books university-wide research and outreach-oriented environmental projects. Emphasis is placed on seeking, developing and coordinating multidisciplinary programs for over 500 NC State University faculty working this area. Additionally, Environmental Programs represents the interests of NC State University on a number of university, state and national boards and committees. The office manages the Internet environmental server, which includes the environmental directory, develops and expands formal academic programs addressing environmental issues and career partnerships with state and federal organizations, and serves as the catalyst, and information clearinghouse for all NC State environmental programs.

NORTH CAROLINA JAPAN CENTER
F. A. Moyer, *Director*

The North Carolina Japan Center, part of the College of Humanities and Social Science, works to promote better understanding and deeper relations between North Carolina and Japan to the benefit of our state. Activities include a wide range of outreach service and educational programs, including the annual "North Carolina and Japan: Trade Investment" Conference each November and the monthly "First Thursday Club" which presents a diverse range of programs on Japanese culture and society. The Center maintains a library of books, periodicals, and videotapes about Japan, and a reference collection about study and employment opportunities in or relating to Japan. The Japan Center cooperates closely with the NC State Japanese language program (one of the largest in the Southeast) and provides study abroad scholarships for summer language study and full year exchange programs in Japan. For more information, please contact Francis A. Moyer at (919) 515-3450, or email: moyer@social.chass.ncsu.edu

BIOTECHNOLOGY PROGRAM
M. A. Conkling, *Director*

The Biotechnology Program at NC State includes some 80 faculty representing 21 departments in the Colleges of Agriculture and Life Sciences, Engineering, Forest Resources, Physical and Mathematical Sciences, and Veterinary Medicine. The Program administers a Ph.D. minor in Biotechnology that may be taken by students who reside and conduct their research in one of the participating departments. To minor in Biotechnology, the student must complete at least six credit hours of biotechnology laboratory courses and must conduct graduate research in the area of biotechnology. Research in biotechnology is multidisciplinary encompassing three main areas: molecular biology, bioprocessing/bioanalytical techniques, and *in vitro* cell culture.

MATERIALS RESEARCH CENTER
R. F. Davis, *Director*

The Materials Research Center was established in 1984 at NC State as an interdisciplinary program involving persons representing the Departments of Chemistry, Electrical and Computer Engineering, Materials Science and Engineering, and Physics. The principal thrust area of the center involves fundamental studies in the epitaxy of compound semiconductors. The center serves as a focal point for this cooperative research. However, the experimental efforts are conducted within the four departments noted above.

SEA GRANT COLLEGE PROGRAM
R. Hodson, *Director*

The North Carolina Sea Grant College Program is a state/federal partnership program that involves all campuses of the UNC system. Headquarted at NC State, also has regional offices in three coastal communities. Sea Grant combines the University's expertise in research, extension, and education to focus on practical solutions to coastal problems. Graduate and undergraduate research opportunities are available through Sea-Grant funded researchers and through two national fellowship programs.

WATER RESOURCES RESEARCH INSTITUTE
K. H. Reckhow, *Director*

The Water Resources Research Institute is a unit of the University of North Carolina System and is located on the campus of NC State.

The institute was established to promote a multi-disciplinary attack on water problems, to develop and support research in response to the needs of North Carolina, to encourage strengthened educational programs in water resources, to coordinate research and educational programs dealing with water resources, and to provide a link between the state and federal water resources agencies and related interests in the University.

Research and educational activities are conducted through established departments and schools of the university system. All senior colleges and universities in North Carolina are eligible to participate in the institute's research program.

NCSU LIBRARIES

S. K. Nutter, *Vice Provost and Director*
E. C. Filstrup, *Associate Director for Collection Management, Organization, and Preservation*
C. D. Argentati, *Acting Associate Director for Public Services*
J. E. Ulmschneider, *Assistant Director for Information Technology*
J. Y. Davis, *Assistant Director for Planning and Research*
N. R. Brown, *Acting Assistant Director for Administrative Services*
W. L. Scott, *Assistant Director for Organizational Learning and Design*

The NCSU Libraries consists of the **D. H. Hill Library** and four branch libraries. The branch libraries—the **Burlington Textiles Library** in the College of Textiles, the **Harrye B. Lyons Design Library** in Brooks Hall, the **Natural Resources Library** in Jordan Hall, and the **Veterinary Medical Library** in the College of Veterinary Medicine—serve the special needs of their respective colleges and schools. Also affiliated with the NCSU Libraries are the Learning Resources Library in Poe Hall and the African American Cultural Center Reading Room in the Witherspoon Student Center Annex. The D. H. Hill Library operates a 24-hour schedule during the fall and spring semesters.

The NCSU Libraries hold more than 2.7 million volumes of books, bound journals, and federal government publications, over 35,500 print and electronic serials, and over 4.7 million microforms. Collections strengths are in the biological and physical sciences, engineering, agriculture, forestry, textiles, and architecture, with the arts, humanities, and social sciences also well represented. The NCSU Libraries has been a depository for U.S. government publications since 1924 and receives over 80 percent of these publications. The library is also a partial depository for N.C. government documents.

Access to the HYPERLINK "http://www.lib.ncsu.edu/" NCSU Libraries Information System is available on the Web at http://www.lib.ncsu.edu/ This extensive Web site provides information about the Libraries' collections and services, as well as serving as a gateway to Internet resources and databases that support the university curriculum. Numerous bibliographic and full-text databases in all disciplines are also available through the information system from on- and off-campus locations. In addition, the Libraries offers staff-assisted searching of other online databases on a cost-recovery basis. An online catalog permits rapid identification of materials in the collections of the NCSU Libraries, as well as those of Duke University, UNC-Chapel Hill, and N.C. Central. An automated circulation system provides quick, easy check-out of materials. Through the Web-based electronic-reserve service, students can obtain course readings and other materials that supplement classroom instruction.

Digital library services include the availability, via e-mail or Web, of reference assistance and interlibrary loan request forms. MyLibrary@NCSState [Please add hyperlink to http://my.lib.ncsu.edu/], available at http://my.lib.ncsu.edu/, is a customized interface to the library's information resources. Resource sharing, made possible through the Libraries' participation in the Triangle Research Libraries Network (TRLN), includes a delivery service for NC State clients and greatly enhances the research capabilities of the NCSU Libraries.

Facilities and equipment are also available for both individual and group use of audiovisual media. The D. H. Hill Library's theatre has a large collection of video, audio, and multimedia titles for individual and class use, and films in the State Library's film collection can be borrowed for academic use by faculty and students. The Media Center is also equipped with audio and video equipment in carrels for group and individual viewing and listening.

LEARNING RESOURCES LIBRARY

M. A. Link, *Coordinator*
C. A. Cranford, *Assistant Coordinator*

The Learning Resources Library, administered by the College of Education and Psychology, is located in 400 Poe Hall. The library maintains a collection of education materials with particular emphasis on teaching methods, research, administration, and psychology. It includes films, filmstrips, slides, audiotapes, videocassettes, videodiscs, simulation games, and computer software. Audiovisual equipment is available for previewing materials in the library. The library acquires textbooks adopted by the State Board of Education for secondary level subjects, as well as other selected textbooks and reference materials. The mission of the library is to support programs in the College of Education and Psychology. Lending policies permit the use of certain materials by the larger campus community for instructional and research purposes.

ACADEMIC COMPUTING

S.F. Averitt, *Interim Vice Provost for Information Technology*
C.W. Malstrom, *Assistant Vice Provost for Information Technology*

NC State offers many computing resources and services to its students, including access to the campuswide data communications network and distributed computing environment, the Internet, computing facilities, and computing help. Individual colleges and departments on campus also provide computing resources specifically for students in their curricula.

The University's high speed fiberoptic data communications network currently interconnects over 10,000 computers on campus and provides direct connections to the Internet, including email, ftp, telnet,and the resources of the WorldWide Web. In addition to the academic buildings and computing facilities that have direct data communications connections, all campus residence halls and fraternity court are being wired, giving students the option of having direct Internet access from their rooms.

Unity/EOS is the campuswide Unixbased distributed computing environment. Unity computing accounts (or EOS accounts for engineering students) are automatically generated for all students at NC State when they first register for classes. Unity/EOS accounts provide access to the campuswide computing environment and the Internet, email addresses, an allocation of network file space, the use of software on the network, and access to Unity computing labs. Instructions for logging in to accounts and finding help with learning the system are available in the labs as well as from Computing Services and online (see below).

Unity/EOS labs are equipped with NT and Macintosh workstations. These labs provide direct access to the Unity/EOS computing environment. There are currently seven Unity labs on campus: Building D, Avent Ferry Complex; 109 Laundry Building;D.H. Hill Library (2nd Floor); 119A North Hall; 103 Sullivan Residence Hall; and 33 Tucker Hall. Students with EOS accounts have access to EOS labs. Unity/EOS accounts and file space can also be accessed in textonly mode by telnet and dialup services.

The University also maintains a large World Wide Web site, which is becoming increasingly important for conveying information about NC State to the campus community and the world. Students can find out about grades, courses, campus events, and do research online at anytime of the day or night.

Computing Services provides support for academic computing at NC State, including support for Unity/EOS, Unity/EOS computing accounts, and Unity computing labs. A team of expert computing consultants is available to help students learn and use the campuswide computing environment. The Computing Services' Information Center is in Room 208 of the Hillsborough Building.

In addition to the computing resources available to all students on campus, individual colleges and departments offer computing facilities and classes specifically for students enrolled in their curricula. Students are encouraged to find out what computing resources are available to them from their departments.

RESEARCH TRIANGLE

NC State is one of the three Research Triangle universities along with Duke University in Durham and the University of North Carolina at Chapel Hill. Within the 30 mile triangle formed by the three universities is the 6,800acre Research Triangle Park, location of many public research agencies and private research centers of national and international corporations.

The unique "Research Triangle" in North Carolina has captured national and international attention. It is comprised of the Research Triangle Park, a world renowned research park, and three major research universities. Because of this wealth of educational and research opportunities, the Triangle are contains the highest total of Ph.D. scientists and engineers per capita, in the nation. The Triangle universities--North Carolina State University, the University of North Carolina at Chapel Hill, and Duke University--have a subsidiary campus in the Research Triangle Park--the Research Triangle Institute. The Institute, which operates as a contract research organization, has an annual research revenue of approximately $122 million.

The Research Triangle Park, founded in 1959, now has more than 59 private and public industrial research facilities, situated on 6,800 acres of land. Over 34,000 people work in the Park and over 30,000 additional jobs have been created outside the Park as a result of its existence. Organizations in the Park include such government facilities as the National Humanities Center, the National Institute of Environmental Health Sciences, the Environmental Protection Agency, and the National Center for Health Statistics. Private companies such as Glaxo Pharmaceuticals, Northern Telecom, and Reichhold Chemicals have their North American headquarters in the Park. Two major, state-supported research initiatives in Microelectronics and Biotechnology are located in the Park and North Carolina's Supercomputing Center is housed there as well. Faculty and graduate students from the universities work closely with many of the Park companies. Scientists and researchers from companies like Burroughs Wellcome, IBM, and Becton-Dickinson frequently hold adjunct appointments in one or another of the Triangle Universities.

RESEARCH CENTERS AND FACILITIES

ANIMAL AND POULTRY WASTE MANAGEMENT CENTER
M. Williams, *Director*

The Animal and Poultry Waste Management Center establishes partnerships among universities, agribusiness and other organizations to address waste management concerns. Partner universities are Iowa State, Michigan State, Missouri, Oklahoma State, Georgia, Mississippi State and Virginia Polytechnic Institute; commodity groups also are members. Environmental groups and regulatory agencies serve the Center in an advisory role. Center-sponsored projects include many technology applications, which are targeting livestock odor abatement and the improvement of water quality associated with animal waste management. Other Center work includes: providing facilities and equipment for carrying out research and extension activities on the management and use of animal agriculture wastes, and developing economical and environmentally sound technologies for converting wastes to useful products. The Center also sponsors projects to reduce nutrients in animal waste by use of animal genetics and dietary manipulation of traditional feeds, and advises small businesses and international agricultural industries of the best waste management alternatives for their needs.

BIOLOGY FIELD LABORATORY
P. D. Doerr, *Director*

The Biology Field Laboratory is located six miles from the University campus and comprises two small streams, a 20 acre pond, 50 acres of varied terrestrial habitats and several laboratory buildings. Three hundred and fifty adjacent acres of timbered watershed managed by NC State in cooperation with the State Forest Service are also available for similar uses. The facilities, used for laboratory and field instruction and for undergraduate, graduate, and faculty research, are particularly suited for use by advanced classes in several biological science departments from the Colleges of Agriculture and Life Sciences and Forest Resources.

CENTER FOR ADVANCED ELECTRONIC MATERIALS PROCESSING (AEMP)
J. R. Hanser, *Director*

The Center for Advanced Electronic Materials Processing was established in 1988 as a National Science Foundation Engineering Research Center. It also includes an SRC research program on Advanced Single Wafer Processing. The Center's program is interdisciplinary involving collaboration among chemists, physicists, materials scientists and electrical, chemical and mechanical engineers. The research focuses on the development of processing technologies capable of producing submicron electronic devices. The program emphasizes rapid thermal processing and low-temperature plasma-processing techniques. It is a joint effort involving researchers from the University of North Carolina (Chapel Hill), Duke University and North Carolina A&T State University. Undergraduate Scholar Awards are available for qualified undergraduates with interest in electronic materials and devices.

CENTER FOR ASEPTIC PROCESSING AND PACKAGING STUDIES
K. R. Swartzel, *Managing Director*

The Center for Aseptic Processing and Packaging Studies was established in October 1987 to promote cooperative research between University and industrial researchers and to further scientific knowledge in areas of food and pharmaceutical aseptic

processing and packaging. The center is funded by the National Science Foundation, NC State and other universities, and industrial members from food, processing, and packaging industries. The objectives of the center are to support industrially relevant, fundamental research in aseptic processing and packaging; to enhance product quality and improve efficiency; and to communicate information gained from basic research to industry for development and marketing.
Students working on CAPPS projects will be exposed to industrial concerns and be given the opportunity to work first-hand with industry in solving problems and making practical application of their research. Cooperative research opportunities are available in the Department of Food Science at NC State and also at other universities.

CENTER FOR ADVANCED COMPUTING AND COMMUNICATION
Wesley E. Snyder, *Director*

CACC is an NSF-sponsored Industry/University Cooperative Research Center with research sites at NC State University and Duke University. An advisory board comprised of representatives of member companies and government agencies meets twice a year to direct the Center's research activities. Faculty and graduate students also work closely with each member's technical staff on a variety of research projects. Current members include Bellcore, Bellsouth, Department of Defense, Ericsson Inc., IBM, NASA Lewis Laboratories, Naval Surface Warfare Center and US Air Force Rome Laboratories.
The Center's mission is to carry out basic and applied research on problems having both industrial and academic relevance, to transfer these results to our members, and to provide our students with a challenging educational opportunity. Our research goal is to create concepts, methods, and tools for use in the analysis, design, and implement of advanced computer and communication systems. CACC is uniquely equipped to serve as a testbed for new networking hardware, software, and protocols because of its state-of-the-art Networking, Multimedia and Imaging Laboratories.

CENTER FOR CUTANEOUS TOXICOLOGY AND RESIDUE PHARMACOLOGY
J. E. Riviere, *Director*

The Center for Cutaneous Toxicology and Residue Pharmacology performs scientific research on cutaneous function and structure focused on cutaneous toxicology, metabolism and pharmacokinetics and transdermal drug delivery, employing innovative animal models and other predictive systems. This provides the necessary research base to support a rigorous graduate and post-graduate training program in comparative pharmacology and toxicology designed to produce health scientists for academia, industry and government. Besides laboratory research, CCTRP also operates the US and global Food Animal Residue Avoidance Databank (FARAD), performs the residue avoidance data analysis, and provides assistance to those who have a question about how to prevent residues in animal-derived food.

CENTER FOR RESEARCH AND DEVELOPMENT IN MATHEMATICS AND SCIENCE EDUCATION
S. B. Berenson, *Director*

The center, one of ten centers in the North Carolina Mathematics and Science Education Network, is the only research and development center in the network. Established in 1984, the center is in the Department of Mathematics, Science and Technology Education in 1984; and conducts research and development activities for precollege students, preservice teachers, inservice teachers, and University faculty. The center identifies areas of need in mathematics and science education and forms partnerships with federal, state, local and private funding agencies to work collaboratively to address the needs. Grants have been obtained from the National Science Foundation, Office of Education, State Department of Public Instruction, Local Education Agencies, the Ford Foundation, and IBM to introduce changes that incorporate technology and active learning into the mathematics and science curriculum, K-16. In addition, the center supports graduate students and provides them with opportunities to write grants and to design, conduct, and report on educational research.

CENTER FOR RESEARCH IN SCIENTIFIC COMPUTATION
H. T. Banks, *Director*

The Center for Research in Scientific Computation (CRSC) is a formally recognized, multidisciplinary center of the greater University of North Carolina System. The CRSC is administered by NC State and the College of Physical and Mathematical Sciences. The purpose of the Center is to promote research in scientific computing and to provide a focal point for research in computational science, engineering, and applied mathematics. Data-massive and/or computationally intensive problems provide ideal projects for training graduate students in applied mathematics. With advanced computing methodologies students and post doctoral fellows address important issues in processes of modeling and design.

Research topics of interest to CRSC faculty include a variety of problems in scientific computation, numerical analysis, and numerical optimization with applications to such areas as fluid mechanics and flow control, smart materials and structures, nondestructive testing, acoustics, material sciences and manufacturing processes, population dynamics, environmental sciences, signal processing, computer performance evaluation and nuclear reactor physics.

The CRSC, in cooperation with the Department of Mathematics, sponsors a university/industrial research project program. The main goal of the Industrial Applied Math Program (IAMP) is to provide substantive non-academic research-related experiences for graduate students, postdoctoral and faculty participants while contributing to the research efforts of industrial participants.

CENTER FOR SOUND AND VIBRATION

R. T. Nagel, *Director*

The Center for Sound and Vibration, established in 1969 and administered within the Department of Mechanical and Aerospace Engineering, comprises faculty pursuing the solution to a wide variety of vibration and acoustic problems occurring in machinery and aircraft design. Graduate programs exist at M.S. and Ph.D. levels in such fields as noise and vibration control, structural acoustics, aeroacoustics, hearing conservation, computer aided machinery design, architectural and musical acoustics, and acoustic signal processing. Outstanding experimental facilities, which include large anechoic and reverberant rooms and computer graphics equipment, are available. The center's programs are financed largely by grants and contracts from industry and federal and state agencies.

CENTER FOR TRANSPORTATION AND THE ENVIRONMENT

J. S. Fisher, *Director*

The Center for Transportation and the Environment conducts programs of research, education, and technology transfer that seek to mitigate the impacts of surface transportation on the environment. Funded by the U. S. Department of Transportation, with matching monies from North Carolina DOT, CTE is the only university transportation in the country that pursues ways to improve surface transportation systems while protecting the environment. CTE is considered a national resource for current information about transportation and environmental research, policies, and best practices. The Center conducts an innovative and aggressive outreach program, using satellite- and computer-based technologies, to assist transportation and environmental professionals with their most critical information needs. For more information, visit CTE's Web site at: http://itre.ncsu.edu/cte

ELECTRIC POWER RESEARCH CENTER

J. J. Grainger, *Director, Electrical Area*
P. J. Turinsky, *Director, Nuclear Area*
W. E. Vickery, *Executive Director*

The Electric Power Research Center, established in 1985 within the NC State College of Engineering, is supported via membership fees, enhancement grants, and normal research contracts by organizations from the various sectors of the electric utility and power industry, including national laboratories and private interests. The purpose of the center is to collaborate in enhancing the excellence of a wide range of research and graduate-level degree programs in electric power systems from power generation to end usage. This primary purpose is accomplished by supporting interested faculty and students' involvement in basic and applied research directly relevant to the needs of the multifaceted electric power industry. Motivation to work with the center derives from the close University/membership interaction, the leverage afforded members via pooled resources, and the enhanced professional and research opportunities provided to faculty and students in electric power engineering.

The current research program involves faculty from the Department of Nuclear Engineering and the Department of Electrical and Computer Engineering.

ELECTRON MICROSCOPE FACILITIES

There are four electron microscope facilities at NC State available to graduate students and faculty for research purposes. The College of Agriculture and Life Sciences Center for Electron Microscopy is located in Gardner Hall, the Engineering Research Microscope Facility is in Burlington Engineering Labs and the Department of Wood and Paper Science Electron Microscopy Lab is in Biltmore Hall. The College of Veterinary Medicine Laboratory for Advanced Electron and Light Optical Methods (LAELOM) is located at 4700 Hillsborough Street in Raleigh.

The College of Agriculture and Life Sciences Center for Electron Microscopy

J. M. Mackenzie Jr., *Coordinator, CALS Center for Electron Microscopy*

The College of Agriculture and Life Sciences Center for Electron Microscopy occupies approximately 3000 square feet in the basement of Gardner Hall. It is a centralized facility which services the ultrastructural needs of twenty-two Departments.

The CALS Center for Electron Microscopy offers complete service support in all areas of Biological Electron Microscopy. The Center has two scanning microscopes: a Philips 505T and a new JEOL 5900LV which has low vacuum capabilities and two transmission electron microscopes: a JEOL 100S and a Philips 400T-STEM. The Philips microscope is equipped with a

C400M computer control system which includes a five-axis computer controlled stage. Both scanners are equipped with all of the necessary biological, preparatory equipment including cryo-sectioning and a Balzers freeze-etch apparatus.

The Center provides advanced, digital imaging capabilities. All computers including those on dedicated instruments are networked to two high-speed servers and to our University system. We provide access for Macintosh, PC and UNIX based systems allowing transparent information transfer regardless of user's platform preference. Our servers provide support for both Windows NT and Novell Clients.

Formal instruction is provided through the Microbiology curriculum for transmission electron microscopy, scanning electron microscopy, ultramicrotomy and digital imaging. The Center also provides support, service and training in a wide variety of advanced digital imaging. Advanced techniques are usually taught on an individual basis.

The Engineering Research Analytical Instrumentation Facility (Aif)
P. E. Russell, *Director, Engineering Analytical Instrumentation Facility*

The Engineering Research Analytical Instrumentation Facility (AIF) provides NC State faculty and students the best of the modern microanalysis instrumentation currently available as well as trained specialists to assist with instrument operation and experimental design. AIF is equipped with seven major research tools for the examination of metallurgical, ceramic, electronic and other materials. A Scanning Auger Microprobe (JEOL JAMP-30) and a Secondary Ion Mass Spectrometer (Cameca IMS 3F) provide surface analytical capability. The scanning auger microprobe is capable of surface analysis of the top three atomic layers of a solid material with a lateral resolution of 50 to 100 nanometers. In addition, the auger microprobe, equipped with an argon ion gun, provides in depth profiling analysis through thin films. The secondary ion mass spectrometer can perform elemental and isotope analysis to monolayer depths with part per million sensitivity and with lateral resolution of 1 micrometer. This system can also provide in depth profiling analysis which is especially important for implanted semiconductor analysis. Three 200KV transmission electron microscopes (a Hitachi H-800 Scanning Transmission Electron Microscope [ASTEM], a Topcon 002B high resolution Transmission Electron Microscope, a Topcon 002B Analytical Transmission Electron Microscope [ATEM]) provide spatial resolution down to 1.4Å on suitably prepared samples. The high voltage EM's enable the researcher to examine thicker specimens. The ASTEM and ATEM are equipped with energy dispersive X-Ray (EDX) systems. The X-Ray analytical capability is used in conjunction with high resolution imaging for qualitative and quantitative elemental analysis of small amounts of material (down to cubic microns in bulk material and a few hundred nanometers in thin samples). The 002B ATEM is equipped with a low Z EDX system capable of light element detection down to beryllium. Two Scanning Electron Microscopes (a Hitachi S-530 and a JEOL 6400FE) are also available and are both equipped with energy dispersive X-Ray (EDX) detectors. The 6400FE is a low voltage, high resolution field emission SEM capable of 15Å resolution and is equipped with a light element EDX system which can detect low Z elements down to boron. Finally, AIF is completely equipped for specimen preparation and technical photography in the physical sciences.

The Department of Wood and Paper Science Microscopy Lab
E. A. Wheeler, *Coordinator, WPS Microscopy Lab*

The Department of Wood and Paper Science Microscopy Lab has equipment necessary for the preparation and study of specimens with light microscopy.

The CVM Laboratory for Advanced Electron and Light Optical Methods
M. J. Dykstra, *Director, CVM Laboratory for Advanced Electron and Light Optical Methods*

The CVM Laboratory for Advanced Electron and Light Optical Methods (CVM-LAELOM) is a full-service facility providing clinical and research support for the CVM as well as the full NC State campus. The CVM-LAELOM houses a Philips 410LS transmission electron microscope and a JOEL JSM-35CF scanning electron microscope with all the necessary support equipment for tissue preparation as well as extensive darkroom facilities for the production of electron microscopy materials. The darkroom facility contains equipment for user-produced prints, 2 x 2 slides, 4 x 5 copy negatives, publication prints, posters, and film development. In addition, the CVM-LAELOM offers the use of an Olympus VANOX compound light microscope equipped for bright-field, epifluorescence and polarizing microscopy. A morphometry, digitizing and archiving package is coupled to the VANOX. A Wild photomacroscope is also available for viewing and photographing larger specimens with bright- and dark-field optics.

INSTITUTE OF STATISTICS
T. M. Gerig, *Director*

The Institute of Statistics is composed of two sections, one at Raleigh and the other at Chapel Hill. At NC State, the institute provides extensive collaborative and advisory services in experiment design, data management, data analysis, mathematical modeling and statistical computing to the University community and beyond. The institute has interactions with state and federal agencies and with private industries.

INSTITUTE FOR TRANSPORTATION RESEARCH AND EDUCATION
G. Gilbert, *Director*

The Institute for Transportation Research and Education conducts research and training for numerous public agencies at the federal, state, and local levels of government and for some private firms. Established in 1978, the Institute conducts programs in public transit operations, highway operations, transportation finance, geographical information systems, pupil transportation, and technology transfer. The Institute is also the home of the Center for Transportation an the Environment, a prominent national research facility.

INTEGRATED MANUFACTURING SYSTEMS ENGINEERING INSTITUTE
T. J. Hodgson, *Director*

The Integrated Manufacturing Systems Engineering Institute was established at NC State in 1984 to provide a multifaceted educational, research, and technology transfer initiative in manufacturing systems engineering. The objectives of this program are to educate engineers in the theory and practice of advanced design and manufacturing methods at the master's degree level; to conduct basic and applied research on topics related to contemporary manufacturing problems; and to engage in technology transfer to increase productivity and improve the quality of manufactured products.
The central goals of the institute are to integrate computer-aided processes into the design and control of manufacturing facilities enabling them to produce manufactured goods of improved quality at lowered cost. Through both internally and externally funded research projects the institute helps solve generic manufacturing systems engineering problems and provides a vehicle for technology transfer.

MARS MISSION RESEARCH CENTER
Gerald Walberg, *Director*

The Mars Mission Research Center is one of nine University Space Engineering Research Centers established by NASA in 1988 to broaden the nation's engineering capability to meet the critical needs of the civilian space program. The goal of the center is to focus on educational and research technologies used in the design of spacecraft for advanced space missions. The program involves faculty, undergraduate and graduate students from several different colleges at NC State. The research is a cross-disciplined program involving (1) hypersonic aerodynamics and propulsion, (2) composite materials and fabrication, (3) light-weight structures, (4) spacecraft controls, and (5) space missions analysis and design. Students and faculty conduct part of their research at NASA Centers and participating industries.

NONWOVENS COOPERATIVE RESEARCH CENTER
S. K. Batra, *Director*

Nonwovens Cooperative Center (NCRC) was established in 1991 and has been funded by National Science Foundation (NSF), State of North Carolina and industrial membership. The NCRC is located at the College of Textiles in the Centennial campus. The Center serves the nonwovens industry through its programs of generic fundamental and applied research in the technologies of the industry as well as through an active program of technology transfer. The core research program centered o product performance, process development and analysis, and materials application/development. The Center also pursues non-core research projects sponsored by companies on specific problem on a proprietary or non-propriety basis.

The Center provides opportunities to gain hands-on experience in nonwovens research to students studying toward BS, MS and Ph.D. degrees. Faculty members from NCSU, Georgia Tech, Clemson University, University of Tennessee etc. are involved in several research projects funded by the NCRC.

Major Industrial members include Dupont, Freudenberg, PGI, P&G, 3M, Albany International, Eastman, Cotton Inc., Wellman, Goulston, Fiber Visions, Fiber Innovation Technology, Kimberly Clark, Trevira-Hoechst, J.D. Hollingsworth, CHA Industries, and INDA.

NUCLEAR SERVICES
J. N. Weaver, *Manager*

Specialized nuclear service facilities are available to the University faculty, students, state and federal agencies, and industry. The purpose of these facilities is to further the use of nuclear energy in engineering research and in scientific and public service programs. The facilities include: a 1 megawatt steady-state, pool-type, research reactor (PULSTAR) with a variety of test facilities; a neutron activation analysis and radioisotope laboratory equipped with three ORTEC 919 Gamma Spectrometry Systems coupled to ten GeLi solid-state detectors, two LEPD detectors and two 5" NaI detectors; a prompt gamma facility; a neutron depth profile facility; a neutron radiography facility, a low level counting laboratory equipped with liquid scintillation systems, radon systems, alpha spectrometry systems and an oxidizer; intermediate hot laboratories with hoods, junior caves and glove boxes; transuranic nuclear materials laboratory and computing and photographic rooms.

Nuclear Services also provides short courses in radioactivity usage, laboratory experiments for related courses in other departments, plus scholarships and part-time employment for students in the Nuclear Engineering curricula.

The 50,000 square-foot Burlington Engineering Laboratories complex houses the Department of Nuclear Engineering and the Department of Materials Science and Engineering with their associated offices and laboratories. All of the facilities including the Pulstar reactor are on the NC State campus.

OAK RIDGE ASSOCIATED UNIVERSITIES (ORAU)

NC State has been a sponsoring institution of Oak Ridge Associated Universities (ORAU) since 1949. ORAU is a private, not-for-profit consortium of colleges and universities and a management and operating contractor for the U.S. Department of Energy (DOE) with principal offices located in Oak Ridge, Tennessee. Founded in 1946, ORAU provides and develops capabilities critical to the nation's technology infrastructure, particularly in energy, education, health, and the environment. ORAU works with and for its member institutions to help faculty and students gain access to federal research facilities; to keep members informed about opportunities for fellowship, scholarship, and research appointments; and to organize research alliances among our members in areas where their collective strengths can be focused on issues of national importance. Contact Jack H. Britt, (919) 513-6213 for more information about ORAU programs.

PESTICIDE RESIDUE RESEARCH LABORATORY
R. B. Leidy, *Director*

The Pesticide Residue Research Laboratory is a facility in the College of Agriculture and Life Sciences devoted to research on pesticide residues in air, plants, soils, water and other entities of man's environment. Although the laboratory is administered through the Department of Toxicology, it provides pesticide residue analyses for research projects in all departments of the college.

Not only does the laboratory perform interdepartmental residue research, but faculty in the laboratory also conduct independent pesticide research on persistence and decomposition of pesticides in air, soils and plants, absorption and translocation in plants, distribution in the environment, and contamination of streams, estuaries and ground water.

PLANT DISEASE AND INSECT CLINIC
R. K. Jones, *Director*

The Plant Disease and Insect Clinic (PDIC) provides a unique diagnostic and educational service to plant growers in North Carolina. It is an integral part of the extension program in the Plant Pathology and Entomology Departments. The PDIC receives approximately 8,000 problem samples each year. County Agents, Extension Specialists and growers submit samples from agricultural crops, forests, urban gardens, house plants, etc. This provides an opportunity to observe and work with practical problems currently developing and causing damage.

There are constant and increasingly rapid changes taking place in agricultural technology. These changes influence pest problems that require new types of assays and more sophisticated laboratory examinations. Plant problems must be correctly diagnosed and proper control strategies employed as quickly as possible for growers to minimize losses. The PDIC provides a vital link between the numerous highly specialized resources and faculty members at NC State and the practical plant problems in the field. New or unusual outbreaks of plant diseases and insects can be quickly detected through the PDIC.

POWER SEMICONDUCTOR RESEARCH CENTER
B. J. Baliga, *Director*

The Power Semiconductor Research Center was established as an industrial consortium at North Carolina State University on July 1, 1991. It has garnered support from around the world with more than a dozen companies participating in the venture. The mission of the center is to perform fundamental studies on semiconductor technology for power electronics applications. Although many centers have been established in the past for performing research in the area of microelectronics, PSRC was the first center to focus the research towards power electronics applications. The power electronics applications that will benefit from this research have widespread utility in society. These applications require devices capable of operating over a voltage range of 50 to 10,000 volts and handling currents ranging from 0.1 to 1,000 amperes. Examples of these applications are computer power supplies and automotive electronics at relatively low operating voltages (50 to 100 volts); displays, telecommunications, appliance controls, and motor drives at medium operating voltages (300 to 1,500 volts); and traction (electric trains), and power transmission systems at high operating voltages (2,000 to 10,000 volts). Power semiconductor devices determine the pace for technological advancements in power systems because of the continuing trend to reduce size and weight and to improve the efficiency. This has important social implications in terms of conservation of fossil fuels and reduction of environmental pollution.

The applications require three basic components: (1) three terminal power switches, (2) power rectifiers, and (3) power/high voltage integrated circuits. The research program at PSRC was structured with the goal of developing improved power semiconductor chips in all of these three categories from a short and long term perspective. The following research thrust areas have been worked on since the inception of the center: (a) Power rectifiers, (b) Power MOS-Gated Thryristors, (c) Large Area Power MOS Technology, (d) Dielectrically Isolated Devices for Power Integrated Circuits, (e) Silicon Carbide Technology for Power Devices, and (f) Cryogenic Operation of Power Devices. Although the research is directed towards the development of generic, pre-competitive technology, care has been taken to maintain strong industrial relevance. Silicon devices have been developed which allow 2 to 20 fold improvement in performance for low voltage applications. This technology has already been licensed for product introduction. The theoretically projected performance of silicon carbide high voltage devices has been confirmed experimentally. This technology is expected to play an important role in the 21st century. The research has been documented and shared with the sponsors in the form of 40 patents and 230 technical reports provided to them over the last 8 years of operation. Due to the strong support of the international industrial community, this center is now recognized as the premier research organization for power semiconductor technology in the world.

PRECISION ENGINEERING CENTER

Thomas A. Dow, *Director*

The Precision Engineering Center, established in 1982, is a multidisciplinary research and graduate education program dedicated to providing new technology for high precision manufacturing. It encompasses measurement and fabrication of optical, electronic or mechanical devices where the tolerances required for operation are on the order of 1 part in 100,000; that is, for a 1 inch long part the error must be less than 10 millionths of an inch. Projects involve improved mechanical designs and control algorithms, novel actuators, unique fabrication and measurement techniques and high-speed controllers to implement these concepts. With support from government and industry, the PEC pulls together faculty, staff and students from across the University to develop new ideas and to transfer those ideas to US industry.

SOUTHEASTERN PLANT ENVIRONMENT LABORATORY--PHYTOTRON

J. F. Thomas, *Director*

The Southeastern Plant Laboratory, commonly called the phytotron, is a laboratory especially designed for research dealing with the response of biological organisms to their environment. The high degree of control makes it possible to duplicate any climate from tropical rain forests to arid desert.

The NC State phytotron concentrates on applied and basic research related to agricultural problems encountered in the southeastern United States. The ability to control all phases of the environment, however, allows inclusion of research dealing with all aspects of plant science.

The facilities are available to the resident research staff, participants in NC State's graduate research program and to domestic and foreign visiting scientists.

TRIANGLE UNIVERSITIES NUCLEAR LABORATORY

Werner Tornow, *Director*

TUNL is a laboratory for nuclear physics research, funded by the US Department of Energy. Located on the campus of Duke University in Durham, the laboratory is staffed by faculty members and students from Duke University, UNC-Chapel Hill and NC State. There is extensive collaboration between the participating universities and with visiting physicists from the United States and abroad. The accelerators are a 15-MeV tandem Van de Graaff accelerator and a 4-MeV Van de Graaff accelerator. Polarized and pulsed beams are available as well as cryogenically polarized targets. In addition, TUNL physicists perform experiments at major national and international nuclear physics facilities. More information on TUNL is available on the World Wide Web. The URL address is http://www.tunl.duke.edu.

UNIVERSITY ADVANCEMENT

Jeff McNeill, *Vice Chancellor for University Advancement*

The mission of University Advancement at NC State is to enhance the perception of and knowledge about the University through internal and external communications; to provide alumni, students and friends with programs and services that instill loyalty and pride; to secure resources which will enhance the academic quality of the institution; to be good stewards of its endowments and advance the growth of investment at NC State; and to promote advocacy of the University.

ADVANCEMENT SERVICES

Advancement Services supports the operation of Alumni Relations, Development, Public Affairs, and other units involved with the external mission of NC State by managing the donor/alumni database, conducting donor research, processing and receipting private gifts, maintaining financial records (budgets, payroll, personnel, purchasing, reimbursement, etc.), administering the corporate matching program, managing the donor prospect tracking system, assisting with proposal preparation, and staffing the needs of the NC State Foundation, the Endowment Fund Board, and the Alumni Association business operation.

ALUMNI RELATIONS

The Office of Alumni Relations strives to involve alumni in the life of NC State University and to perpetuate their pride in their alma mater by making them aware of the university's achievements and distinctions. Alumni Relations offers a premier membership program that provides a host of benefits to those who join; organizes alumni activities such as reunions, tailgates and area club meetings; arranges lifelong educational opportunities; enriches student experiences with activities such as homecoming, etiquette training and senior recognition; supports the prestigious John T. Caldwell Alumni Scholarship Program and provides alumni services such as insurance, a credit card and NC State Apparel. Through the pages of *NC State*, the alumni magazine, and a host of other newsletters, Alumni Relations promotes the university with information about notable alumni and university achievements. The NC State Alumni Association is a nonprofit organization administered by the staff of the Office of Alumni Relations. Students and parents are invited to visit the office of Alumni Relations, located in the Alumni Memorial Building on Pullen Road. To inquire about programs or services, call (919) 515-3375 or (800) NCS-ALUM; visit the Alumni Association Web site at **www.alumni.ncsu.edu**, or write the NC State Office of Alumni Relations, Box 7503, NC State University, Raleigh, North Carolina 27695-7503.

DEVELOPMENT

The mission of the Office of University Development is to secure private financial support for priority academic projects and programs from individuals (alumni, parents, students, and friends), corporations, philanthropic foundations, and other organizations at the least cost in an ethical manner through the colleges, schools, and units at North Carolina State University.

University Development's primary focus is to emphasize the creation and implementation of market-driven policies, procedures, strategies and tactics, effectively mobilize volunteers, emphasize higher giving levels, encourage collaboration among colleges, with adequate funding, to foster the investment of private support for unprecedented positive impact on NC State's teaching, research and extension priorities for the 21st Century.

These organizations and units serve as the primary fund-raising entities of North Carolina State University:

College of Humanities and Social Sciences
College of Management
Division of Undergraduate Studies
Graduate School
NC 4-H Development Fund, Inc.
NC Agricultural Foundation, Inc.
NC Dairy Foundation, Inc.
NC Engineering Foundation, Inc.
NC Forestry Foundation, Inc.
NC Textile Foundation, Inc.
NC Tobacco Foundation, Inc.
NC Veterinary Medical Foundation, Inc.
NC State Alumni Association, Inc.
NC State Education and Psychology Foundation, Inc.
NC State Endowment Fund
NC State Foundation, Inc.
NC State Physical and Mathematical Sciences Foundation, Inc.
NC State Student Aid Association, Inc. / Wolfpack Club
Pulp and Paper Foundation, Inc.
School of Design
University Libraries
Visual and Performing Arts Program

PUBLIC AFFAIRS

The Office of Public Affairs conveys the character and excellence of the University to its external and internal constituencies on behalf of the Chancellor, the Administration, and the Faculty; coordinates and supports the communications and marketing efforts of the Colleges, Schools, and Administrative Divisions; and ensures that the electronic and print media have access to complete and accurate information about the University. Public Affairs is divided into two offices. The Office of News Services works with journalists and publishes Bulletin, the faculty/staff newspaper. The Office of Creative Services provides video and multi-media production, publication production, and marketing services.

HISTORY OF THE UNIVERSITY OF NORTH CAROLINA

In North Carolina, all the public educational institutions that grant baccalaureate degrees are part of the University of North Carolina. North Carolina State University is one of the 16 constituent institutions of the multi-campus state university.

The University of North Carolina, chartered by the N.C. General Assembly, in 1789, was the first public university in the United States to open its doors and the only one to graduate students in the eighteenth century. The first class was admitted in Chapel Hill in 1795. For the next 136 years, the only campus of the University of North Carolina was at Chapel Hill.

In 1877, the N.C. General Assembly began sponsoring additional institutions of higher education, diverse in origin and purpose. Five were historically black institutions, and another was founded to educate American Indians. Several were created to prepare teachers for the public schools. Others had a technological emphasis. One was a training school for performing artists.

In 1931, the N.C. General Assembly redefined the University of North Carolina to include three state-supported institutions: the campus at Chapel Hill (now the University of North Carolina at Chapel Hill), North Carolina State College (now North Carolina State University at Raleigh), and Woman's College (now the University of North Carolina at Greensboro). The new multi-campus University operated with one board of trustees and one president. By 1969, three additional campuses had joined the University through legislative action: the University of North Carolina at Charlotte, the University of North Carolina at Asheville, and the University of North Carolina at Wilmington.

In 1971, the General Assembly passed legislation bringing into the University of North Carolina the state's ten remaining public senior institutions, each of which had until then been legally separate: Appalachian State University, East Carolina University, Elizabeth City State University, Fayetteville State University, North

Carolina Agricultural and Technical State University, North Carolina Central University, the North Carolina School of the Arts, Pembroke State University, Western Carolina University, and Winston-Salem State University. This action created the current 16-campus University. (In 1985, the North Carolina School of Science and Mathematics, a residential high school for gifted students, was declared an affiliated school of the University; and in 1996, Pembroke State University was renamed The University of North Carolina at Pembroke through legislative action.)

The UNC Board of Governors is the policy-making body legally charged with "the general determination, control, supervision, management, and governance of all affairs of the constituent institutions." It elects the president, who administers the University. The 32 voting members of the Board of Governors are elected by the General Assembly for four-year terms. Former board chairmen and board members who are former governors of North Carolina may continue to serve for limited periods as non-voting members emeriti. The president of the UNC Association of Student Governments, or that student's designee, is also a non-voting member.

Each of the 16 constituent institutions is headed by a chancellor, who is chosen by the Board of Governors on the president's nomination and is responsible to the president. Each institution has a board of trustees, consisting of eight members elected by the Board of Governors, four appointed by the governor, and the president of the student body, who serves ex-officio. (The NC School of the Arts has two additional ex-officio members.) Each board of trustees holds extensive powers over academic and other operations of its institution on delegation from the Board of Governors.

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OFFICERS OF THE UNIVERSITY OF NORTH CAROLINA

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Richard H. Robinson, Jr., A.B., LL.B. – *Vice President and General Counsel*

POLICY ON ILLEGAL DRUGS

The following policy on illegal drugs was adopted by the North Carolina State University Board of Trustees on April 16, 1988:

Purpose Reflecting its concern over the threat which illegal drugs constitute to higher education communities, the Board of Governors of the University of North Carolina adopted a policy on illegal drugs on January 15, 1988. The Board of Governors' policy requires each constituent institution's Board of Trustees to develop a policy on illegal drugs applicable to all students, faculty members, administrators and other employees. The policy for each campus must address particular circumstances and needs while being fully consistent with specified minimum requirements for enforcement and penalties.

To assist NC State in its continuing efforts to meet the threat of illegal drugs, and to comply with the Board of Governors' policy, the Board of Trustees adopts the policy set forth below. This policy is intended to demonstrate the University's primary commitment to education, counseling, rehabilitation, and elimination of illegal drugs, as well as its determination to impose penalties in the event of violation of state and federal drug laws consistent with all due process protection rights.

Education, Counseling, and Rehabilitation NC State shall maintain a program of education designed to help all members of the University community avoid involvement with illegal drugs. The educational program shall emphasize the incompatibility of the use or sale of illegal drugs with the goals of the University, the legal consequences of involvement with illegal drugs, the medical and psychological implications of the use of illegal drugs, and the ways in which illegal drugs jeopardize an individual's present accomplishments and future opportunities. Specific elements of the education program are:

1. Publicizing the University's policy in the Student Code of Conduct, the undergraduate and graduate catalogs, and other publications distributed to students, faculty administrators, and other employees. The latter publications include the official bulletin, the Student Handbook, the Faculty Handbook, the Handbook for Advising and Teaching, and the Human Resources newsletter.
2. Continuing and expanding the drug education program conducted by Student Health Service.

3. Continuing development of courses on drug education.
4. Continuing the drug education component of the employees' Wellness Program.
5. Increasing the awareness and utilization of the University's Employee Assistance Program (EAP).

The University shall disseminate information about drug counseling and rehabilitation services that are available to members of the University community. Persons who voluntarily avail themselves of such services shall be assured that applicable professional standards of confidentiality will be observed and that such participation will not be the basis for disciplinary action. Specific counseling and rehabilitation efforts include:

1. Continuing the evaluation and referral services of the Counseling Center for out-patient and inpatient rehabilitation.
2. Continuing the consultation and evaluation portions of the Student Health Service's drug education program.
3. Utilizing the Employee Assistance Program's referral to existing community based counseling and rehabilitation services.

Enforcement and Penalties Students, faculty members, administrators, and other employees are responsible, as citizens, for knowing about and complying with the provisions of North Carolina law that make it a crime to possess, sell, deliver, or manufacture those drugs designated collectively as "controlled substances" in Article 5 of Chapter 90 of the North Carolina General Statutes. The University will initiate its own disciplinary proceeding against a student, faculty member, administrator, or other employee when the offense is deemed to affect the interests of the University. Penalties will be imposed by the University in accordance with procedural safeguards applicable to disciplinary actions against students, faculty members, administrators, and other employees, as required by Section 502D(3) and Section 603 of the University Code, by Board of Governors' policies applicable to other employees exempt from the State Personnel Act, and by regulations of the State Personnel Commission. The penalties to be imposed by the University may range from written warnings with probationary status to expulsions from enrollment and discharges from employment. However, the following minimum penalties, as prescribed by the Board of Governors, shall be imposed for the particular offenses described.

Trafficking in Illegal Drugs

1. For the illegal manufacture, sale or delivery, or possession with intent to manufacture, sell or deliver, of any controlled substance identified in Schedule I, N.C. General Statutes 9089, or Schedule 11, N. C. General Statutes 9090 (including, but not limited to, heroin, mescaline, lysergic acid diethylamide, opium, cocaine, amphetamine, methaqualone), any student shall be expelled and any faculty member, administrator or other employee shall be discharged.
2. For a first offense involving the illegal manufacture, sale or delivery, or possession with intent to manufacture, sell or deliver, of any controlled substance identified in Schedules III through VI, N.C. General Statutes 9091 through 9094 (including, but not limited to, marijuana, phenobarbital, codeine), the minimum penalty shall be suspension from enrollment or from employment for a period of at least one semester or its equivalent.* (Employees subject to the State Personnel Act are governed by regulations of the State Personnel Commission. Because the minimum penalty specified in this section and required by the Board of Governors exceeds the maximum period of suspension without pay that is permitted by the State Personnel Commission regulations, the penalty for a first offense for employees subject to the State Personnel Act is discharge.) For a second offense, any student shall be expelled and any faculty member, administrator, or other employee shall be discharged.

Illegal Possession of Drugs

1. For a first offense involving the illegal possession of any controlled substance identified in Schedule I, N.C. General Statutes 9089, or Schedule II, N.C. General Statutes 9090, the minimum penalty shall be suspension from enrollment or from employment for a period of at least one semester or its equivalent.* *(See * above)*
2. For a first offense involving the illegal possession of any controlled substance identified in Schedules III through VI, N.C. General Statutes 9091 through 9094, the minimum penalty shall be probation, for a period to be determined on a casebycase basis. A person on probation must agree to participate in a drug education and counseling program, consent to regular drug testing, and accept such other conditions and restrictions, including a program of community service, as the Chancellor or the Chancellor's designee deems appropriate. Refusal or failure to abide by the terms of probation shall result in suspension from enrollment or from employment for any unexpired balance of the prescribed period of probation.
3. For second or other subsequent offenses involving the illegal possession of controlled substances, progressively more severe penalties shall be imposed, including expulsion of students and discharge of faculty members, administrators or other employees.

Suspension Pending Final Disposition

When a student, faculty member, administrator, or other employee has been charged by the University with a violation of policies concerning illegal drugs, he or she may be suspended from enrollment or employment before initiation or completion of regular disciplinary proceedings if, assuming the truth of the charges, the Chancellor or, in the Chancellor's absence, the Chancellor's designee concludes that the person's continued presence within the University community would constitute a clear and immediate danger to the health or welfare of other members of the University community; provided, that if such a suspension is imposed, and appropriate hearing of the charges against the suspended person shall be held as prompt as possible thereafter.

Coordinator of Drug Education The University Counsel will serve as coordinator of drug education and, acting under the authority of the Chancellor, will be responsible for overseeing all actions and programs relating to this institutional policy.

Implementation and Reporting This North Carolina State University policy on illegal drugs became effective the beginning of the fall semester of 1988.

Annually, the Chancellor shall submit to the Board of Trustees a report on campus activities related to illegal drugs for the preceding year. The report shall include, as a minimum, the following: (1) a listing of the major education activities conducted during the year; (2) a report on any illegal drug-related incidents, including any sanctions imposed; (3) an assessment by the Chancellor of the effectiveness of the campus program, and (4) any proposed changes in the policy on illegal drugs. A copy of the report shall be provided to the President.

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TEACHING, RESEARCH, EXTENSION FACULTY, AND OTHER ACADEMIC PERSONNEL

*NC State Academy of Outstanding Teachers Member
** Board of Governor's Award Winner

Abad, Jorge A.; Research Associate (Postdoctoral), Plant Pathology; Ph.D.., NC State University
Abbate, Angelo Rudy; Professor, Landscape Architecture; MLA, University of Pennsylvania, Philadelphia
Abdullahi, Ahmad-Rufai; Research Associate, Anatomy, Physiological Science, Radiology; DVM, Ahmado Bello University
Aberman, Harold M.; Adjunct Assistant Professor, Companion Animal and Special Species Medicine; DVM, Purdue University
Aboelfotoh, Mohamed O; Visiting Scientist, Materials Engineering; Ph.D., University of California, Berkeley
Abrams, Charlie F. Jr.; Professor, Biological and Agricultural Engineering; Senior Associate Provost, Provost Office, Academic Affairs; Ph.D., NC State University
Abt, Robert C; Associate Professor, Forestry; Ph.D., University of California, Berkeley
Adams, J. Peter; Adjunct Professor, Food Science; Ph.D., University ofWisconsin, Madison
Ade, Harald; Associate Professor, Physics; Ph.D., SUNY at Stonybrook
Adler, Diane F.; Lecturer, Foreign Languages and Literatures; BA, SUNY College at Buffalo
Adler, Kenneth B.; Professor, Anatomy, Physiological Science, Radiology; Ph.D., University of Vermont & State Agricultural College
Adler, William; Professor, Philosophy and Religion; Ph.D., University of Pennsylvania, Philadelphia
***Afify, Elsayed M.;** Professor, Mechanical and Aerospace Engineering; Ph.D., University of Michigan, Ann Arbor
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Agris, Paul F.; Professor, Biochemistry; Ph.D., Massachusetts Institute of Technology
Aguirre, Alvaro, G.; Visiting Research Assistant, Forestry
Aiman-Smith, Lynda; Assistant Professor, Business Management; Ph.D., Purdue University
Akley, Nancy J.; Lab Supervisor and Research Assistant, Anatomy, Physiological Science, Radiology; BS, Simmons College
Akroyd, Duane; Associate Professor, Occupational Education; Ph.D., Southern Illinois University, Carbondale
Akunda, Jacqueline K.; Research Associate, Dept. of Toxicology; Ph.D., Iowa State University, Ames
Alapaty, Kirankumar V.; Adjunct Assistant Professor, Dept. of Marine, Earth and Atmospheric Sciences; Ph.D., NC State University, Raleigh
Albaugh, Timothy J.; Research Associate, Forestry; MF, Duke University
Alchediak, James; Lecturer, Communication; Program Manager, Communication; MA, Ohio University, Athens
Alder, Ruth A.; Associate Professor, Foreign Languages and Literatures; Ph.D., University of Pittsburgh
Alderman, Cheryl K; Lecturer, Industrial Engineering; Associate Director, Engineering-Academic Affairs; ME, NC State University
Aldige, Virginia M.; Professor, Sociology and Anthropology; Ph.D.. University of North Carolina, Chapel Hill
***Alexander, Samuel T.;** Associate Professor, Electrical Engineering; Ph.D., NC State University
Alexander, Winser E.; Professor, Electrical Engineering; Ph.D., University of New Mexico
Alexieff, Elizabeth W; Visiting Lecturer, Multidisciplinary Studies (MDS); Academic Advisor, First Year College; MA, Appalachian State University
Alibrandi, Marshal; Assistant Professor, Curriculum and Instruction; Ed.D, University of Massachusetts, Amherst
Allen, Brenda F.; Coordinator, College of Textiles-Dean's Office; DED, NC State University
Allen, George C; Research Assistant Professor, Botany; Ph.D., NC State University
Allen, Howard Lee; Professor, Forestry; Director, Forestry - Coop - Fertilization; Ph.D., NC State University
Allen, Janice B; Research Assistant Professor, Anatomy, Physiological Science, Radiology; Ph.D., NC State University
Allen, Jonathan; Professor, Food Science; Ph.D., University of Georgia, Athens
Allen, Nina S; Professor, Botany; MS, University of Maryland, College Park
Allen, Steven G.; Professor, Economics; Program Director, Business Management; Ph.D., Harvard University
Allen, William D.; Visiting Assistant Professor, Electrical Engineering; MSEE, University of Kentucky
Allison, Beecher C.; Extension Specialist, Animal Science; MS, NC State University
Almekinders, Sally Vanmetre; Associate Professor, Physical Education; M.Ed, University of Miami
Almond, Glen William; Professor, Food Animal and Equine Medicine; DVM, Ontario Veterinary College
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Amatya, Devendra M; Research Assistant Professor,, Biological and Agricultural Engineering; Ph.D., NC State University
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